Addicted to
Ball and Club
Juggling

-A guide to improve your juggling-

Addicted to
Ball and Club Juggling

Book 1: Two hands

Part II: patterns and tricks

Trick difficulty list
Thanks to

Preface

Hello. Apparently you've just downloaded this juggling guide or bought some illegal copy somewhere. Don't worry, feel free to copy and distribute yourself. The reason why I wrote it was to spread knowledge about juggling.

I wrote this book mainly when recovering from a backbone fracture. Once I got out of the bed again, I left the almost finished book the rotten some years on my computer. I recently finished it as fast as I could, because I like more to juggle then to write about it. However to publish it it still needs a spelling and grammar correction, an update of examples, better illustrations and so on. But again, as I like more to juggle than to do all that boring work, I prefer to spread it through internet. After all, I wouldn't get rich of it should it get published anyway…

(If you want to correct the spelling and send me the corrected version, don't hesitate)

Last year I thought I wanted to make an illustrative DVD, however when making it I realized once more that I prefer juggling. So finally the DVD I made is a DVD full of creative juggling, but without any boring illustrative "how to juggle" stuff. You can also download that video (Addicted to juggling) on the same site: www.circuspla.net , it features most of Belgians best jugglers and some pretty good French jugglers.

In real live I juggle, clown, and teach juggling. If you're interested to see more of me, check the DVD, or invited the Addicted jugglers to your local convention. Also check www.shakethat.eu , the show which I now play.

In **this book**, juggling is seen as the art of throwing, catching, and manipulating objects. It is something like dance, but with objects; like sculpturing, but with the movement of the objects instead of the form of them.
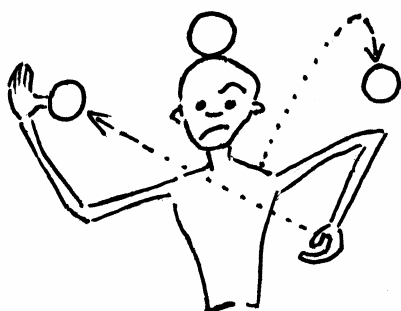
As a good singer is not someone who can reach high notes, but someone who can sing a good song, a good juggler is someone who can perform nice juggling stuff. And that's what this book is all about. It's not about performing, but about juggling nice juggling stuff.

First of all I hope you'll read it, second that you'll become a better juggler because of it and third, that you might invite me and some other Addicted jugglers to your convention.

Structure of the book

There are two parts in the book. The first part is a guide to become a good juggler. It explains how to improve your juggling, by giving training advise and lessons about juggling technique, creativity and knowledge. Although they are all three closely related, I've made them three separated topics.

The second part is a long, ordered list of examples of juggling patterns and possibilities and some explanation and comments on them. Unlike the first part, you shouldn't read it from A to Z, but use it more as a dictionary. Next of most tricks, there's a dice **3**, indicating how much props are involved. Further there are two numbers (*O*=20 !=8) indicating the difficulty of the trick, with balls (O) and with clubs (!). It's an indication, to prevent you wasting your time training on too hard stuff, nothing more.

At the end of the book you'll find to indexes of which one includes all the tricks in the book ordered by difficulty.
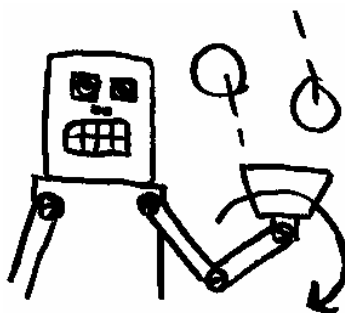
Intro

In this second part of 'ball and club juggling', I give comment on classic and less classic tricks and patterns. Tricks are things you do just ones, a special catch for instance, while patterns are done repetitively,
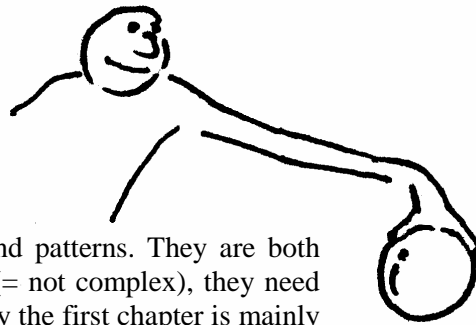
Juggling is a combination of both tricks and patterns. They are both equally important, but as tricks are simple (= not complex), they need less explanation than patterns. Therefore only the first chapter is mainly dedicated to tricks, all the others deal mainly with patterns. Please don't conclude that patterns would be more important.
The same can be said about complex patterns in contrast with simple ones. The simple patterns (as 53, 423, 424x2,...) are much more important, but as there aren't many, most of the patterns discussed are complex ones.

Although you don't explicitly need to read the first part, to understand this second part, I do strongly advise you to do so. Especially the general advise about awareness, view and body posture.

Good luck

Part 1: A juggling course

The first part of the book is more or less a surrogate for a good teacher. First I give general advice on how to work, practical training advice and some lessons on different topics.

Topic 1: General stuff

General working advise

1. The only one who can teach you is yourself.
   > A teacher, a book, videos and the net can only help you. You'll have to train, think and create yourself. Feel free, believe in yourself and go for it.

2. The engine of juggling is or should always be the joy of doing it.
   > Joy is usually the result of the progression you make. All other principles should respect this principle: Progression because of training, training because of joy, and joy because of progression.

3. Awareness is the first step in improvement.
   > Be aware of everything you do. The way you stand, the way you look, the way you pick up, the way you correct a bad throw, …
   > It is not difficult to be aware, everybody can do so. However it is easily overlooked.
   > Some exercises the get more aware of your body are:
   > Slow motion exercises:
   >> Do movements (i.e.: juggling without props) really slow. Try to feel every muscle moving. Every muscle and every bone at the same time, not one by one, but all together. Keep the same exercise long enough.
   > Freeze exercises:
   >> Move, and all of a sudden, freeze. It's best to do this on a sign of another (or something else like a noise or so). Freeze and feel how your position is. Is there one line in your body, or do you stand broken?
   >> Then move again, freely but aware, and freeze again. The better you become aware of your body, the better your frozen statues will stand. They will be strong and expressive, full of motion although still.
   > Awareness exercises:
   >> The more you try to be aware, the better, and easier it will be. Especially while juggling easy stuff, dancing, acrobatics, walking or so you can improve a lot.
   > Mark that awareness of your body and actions will make you less anxious to go on stage. You will feel more in control.

4. Be aware of everything that happens around you.
   > To do so you need to use your whole field of sight. That field is very wide. An exercise to help you widen your view:
   >> Stand still, hold your eyes fixed, and look in front of you. Now, while keeping your eyes fixed look how wide your view is. If there is movement around you try to see everything. If there isn't move your hands. Keep looking in front of you. Try to move your hand towards, and beyond the border of your field of sight. You'll notice that you can see your hands in really extreme positions. Once on the border, focus on the hand on the border and surprise yourself how far that border is.

   > Some exercises to train that awareness:
   >> Move the hands freely around. Keep looking at both hands. If something else passes through your view, then also look at that thing.

Look at things in which several elements move (as a football game), but refuse to look at one element, keep looking at all of them.

Look at a thing with several, not moving elements (as a chessboard), then close your eyes and try to remember it try to remake it (put the chess pieces back). The easiest way to do so is by refusing to look at one element. Always keep looking at everything.

We are not used to look at several things at the same time, and therefore it seems hard at first, but actually it isn't that difficult and it is very useful for juggling and other stuff.

Playing chess blind, is done by keeping looking (in the mind) at all positions at once. When doing so, you do not forget where something stands as you always see everything. Good blind players can do even others thing on the same time, they can discus or even read a book or so while still playing a game of blind chess, because they can view more than a board. NAME, a master in this has once played 78? blind games at the same time. That means he had to have 78? boards in his head at the same time. It's all a matter of training!

You can be aware of what happens around you by listening too. It's less important for jugglers, but it also helps to be more aware.

Be quiet, listen to everything. It's impressive how much noise we don't hear if we don't listen. Now move, listen to your movement. Throw catch. Listen

5. When juggling look at the whole image.

Follow all the props together, on the same time. Focus on a high, central point, but look at everything. So don't look at one ball at a time, but at all of them.

To do so, the previous exercises will help a lot.

6. THINK!

No matter whether you are a theoretically minded Site Swap freak, or a Sunday afternoon dreadlock park juggler, always think why and how. This will make you progress a lot faster.

Why does it work with my right hand but not...?

Why did it work 5 minutes ago and now not anymore?

Why does it works with two props, and not when I ad the third?

Why do I always spin if I juggle five balls?

Why do my balls always smash together?

Why is my third throw always too wide?

Questions as these usually have simple answers. But if you don't ask yourself the question, you won't find the answer, unless you train a lot. So in other words, the answers will make you progress much faster.

Especially the question "what is going wrong?" is important. If a ball always drops because it's thrown too wide, then it is important that you know that it was too wide and that it is always the third, or always with left. Once you know this, you're half the way.

7. Get yourself a notebook and write down what you think and what you do.

Almost everything you notice or know, you will forget. It will be a free memory and a motivating tool. Especially when creating stuff. Write or draw it down.

I repeat: do it. Do it before you make the next catch. Do it now, before you read on. Come on do it.

8. Make plans on long, middle and short terms.

First plan on long terms what you eventually which to achieve. Then according to that, plan on middle and short terms. Something like: I want to become a good three club juggler therefore I will train on high, slow simples now, because that will be important for a lot of three club tricks a bit later on.

It doesn't matter's if your long term objectives change now and then. Even if they change now and then you'll work a lot more focused and motivated.

Now do it. Make such a plan, right now, and write it down in the notebook you've just started.

9. Try to enlarge your juggling possibilities as much as possible
   Do so by training on every aspect of juggling. Don't only improve your technique, but also improve creativity and enlarge your understanding. You'll improve a lot faster if you do so, because your possibilities will rise very fast.
   It isn't so that you need to work on technique first and only when you're good on creativity. It's not a bad thought, but it's less fun and less motivating, and not better.

10. Try to use every mean to improve you have.
    Of those, the best are other jugglers. Concurrence or just practicing together can motivate you a lot. Seeing them juggling can get you on ideas, you can explain stuff to each other, …
    Looking (and listening) to (very) good jugglers can be very interesting. Experienced jugglers will normally be polite and help you, if you ask for advice, because they have had the same problems as you. To see good jugglers, videos, the net, and especially conventions (see at the end of part I) are ideal.
    A good teacher is of course even better, but a good juggler isn't necessarily a good teacher. A good teacher should be able to explain the things you need to know, to do the things you want.

11. Be patient
    With time many things that seem impossible now, will become a piece of cake. Just keep on training, one step at a time.

Practical training advise

12. Warm up before you start.
    Warming up is important to avoid injuries on the long term. If you're not the type of guy that starts with a warming up, if you like to fly into it from the start, then try to start with something gentle. Bounce balls are ideal, contact or crystal ball too.

13. It's good to train daily.

14. It's good to train in long sessions (3-4 hours)
    Although this makes training every day hard. *Sergey Ignatov* says it's very important to train when you're tired, exhausted. Even if you can't juggle on your highest level anymore, just do something easier then.
    Although it's good to train in long sessions, don't train too long on the same thing. Skip to something else and come back on it later during the training.

15. Don't train on too much together.
    Always train at least until you feel it's progressing.

16. On the other hand don't train one trick at a time.
    Do things with balls, clubs, foot-technique, left and right hand, backcrosses, site swaps, high throws, manipulations. Just don't change before it improves.
    If you're a number juggler (if you're only interested in juggling lots of props), it's just as important to train on different things. Then train on endurance with five balls, try to break you're record with six. Train on flashes with seven and four in one hand. Train on force by juggling five heavy balls, ...
    If you do a lot of things, you will forget to train some of them. To avoid that, take your notebook and write down what you do.

17. Always have some balls in your pockets.
    So that you never waste your time waiting. (contact and crystal-ball tricks are ideal)

18. Train stuff similar to the things you want to do on stage and do the things on stage that you like to train.

19. Don't think too fast that you don't like something.
    Some things need time to taste (like beer and wine).

20. Don't drink or smoke too much.

21. Always stop a training session with a trick that works.

Advise on buying and using juggling props

Balls are basic

They are easy, cheap, need little height and cause little problems to juggle in the wind. Therefore you should always have some balls in your pockets. While waiting for the bus, potatoes to boil, your girlfriend to show up…you can amuse yourself and everyone around you.
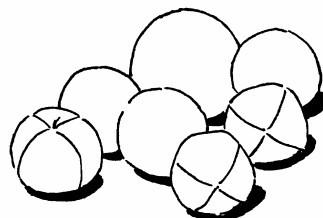
Balls are good for small and fast tricks combined with contact ball-tricks. Second, they are good for complex site swaps (patterns in which the heights of the throws differ). Third, they can bounce on the floor before being caught.

If you buy a set of balls, always buy some extra balls, so you can keep on juggling if you lose one or two. Both for training and for shows it is best to have balls of the same colour. If all the balls have different colours, it makes you dizzy, and it makes elegant patterns lose their look. On the other hand, it can be useful to learn some new patterns if you have a ball in another colour. If you buy balls, buy an ugly, flashy colour, pink or orange Fe. Then the background walls and ceiling will never have the same colour. On conventions, you won't lose them if you're the only juggler with that colour of balls.

Balls have to be round, not too small (>5cm) and not too light (>100gr) unmess you want to flas more than 7 bals (80 grams appears to be ideal for 9 ball flashes).

(Some jugglers like to juggle very big balls. It gives a great visual effect, but it's very hard.)
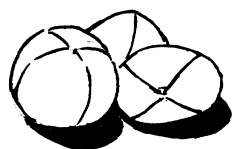
Soft balls:

Beanbags are good to train. They don't roll away when they fall but the throw loses (a very little bit of) precision because they are not completely round. I advise them only to juggle lots of props

Hard balls:

Stage balls are good for performances. They are perfect round and don't ware out but they roll and keep rolling away when they fall down. Multiplex (catching two balls in one hand) can be difficult because they easily bounce out of your hand, but ones you have no problem catching them anymore, they are much more precise. On stage, they have a little bounce that can be useful to catch them if they have dropped.
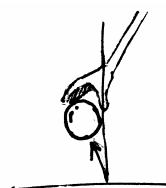
I advise these balls for three ball jugglers. Contact ball tricks become possible, and that's a very big advantage.

Half-hard balls:

Some companies (Mr. Babache and Beard i.e.) make half-hard balls out of plastic, filled up like beanbags. I recommend buying this type of balls to juggle lots of balls, because they combine the advantages of beanbags and stage balls (durable and precise without bouncing out of your hands or rolling very far away).

Rebound balls:
Are used as normal juggling balls too, because they have similar qualities as stage balls. If a ball drops down it can bounce into the public or back into your hand. Some jugglers manage to realise the second option, others don't.
Silicone balls are very durable and keep clean. They are expensive, but worth the price.

Light emitting balls.
Phosphor-balls cost little more then normal balls. They need total darkness; still it can be worth the little extra cost. Light-balls cost a lot but they have great effect. Make sure you don't lose the guarantee note!

Clubs

The shape of the club creates a lot of new possibilities. Difference in the number of spins (flats, simples, doubles, very fast spin, reverse spin…) and the spinning plane for example will result in a different feeling. Further there is much more possible on pauses like loops, flips, flourishes…
Make sure that the clubs you buy have a body and a handle in a different material, and that they contain all the parts shown in the illustration.

Torches

Torches burn. It makes them more spectacular, but less interesting because you can only use one side of the object. Make sure the balance point lies on the handle, otherwise even more possibilities are lost.
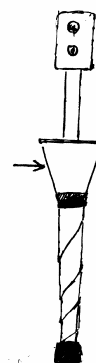
Conventions

On conventions jugglers gather to juggle together. Try to go to Juggling conventions in your region. You can find most of them under the web address: **www.Juggling.org**

Such conventions are organized by jugglers for two reasons: to have fun and to improve by seeing other jugglers. On those conventions you'll see jugglers of every level and every style. You'll see people doing stupid things and others fantastic stuff.
This won't only motivate you to go on, but it will make you able to choose your own direction in juggling, because you can see where something leads to. Further you can learn a lot of new tricks, just by seeing them, or in workshops organized throughout the whole convention.

At evenings there are always free shows, because everybody present is an artist. A lot of professional jugglers try out their new shows on such open stages, while on the same stage beginners try out their first act.
At night some jugglers go on juggling till morning light while others join the party and go on, till morning light.

Little conventions are generally spoken cozier. However big conventions are even better because there are more good jugglers, better open stages, better juggling halls,...

Every year there is a **European Convention** organized by the European Juggling Association. It's always around the first of August, and every year in another country. It's the biggest convention of the world. Some 3000 jugglers are present every year. A lot of the very best jugglers of the world are there. You can see astonishing tricks juggled everywhere around you. There's a nonstop party for ten days, one or more huge juggling halls, every evening hours and hours of free stage,... Al together, it's every juggler's heaven.

Games

As I've said having fun should always stay the main reason to juggle. On convention a whole series of juggling games has been invented. The best ones I have explained under. If you have some juggling friends you can play them at home.

Endurance

It may look boring. But it isn't. You can stay basic, or play some variants. Normally, the rules are this:

Pick a pattern (e.g.: five ball basic pattern, three clubs in simples, club balance on head) that every player can juggle (or different patterns, each on his level). Everybody starts on the same moment. You should try to continue the pattern as long as possible. If you keep the pattern longest, and you stop without dropping, you win. If you drop when stopping, you don't win. It's forbidden to make somebody drop by any way.

You can also play for points. Winning one game results in one point. The next endurance starts just after the previous one stopped. This makes it harder to win two or three consecutive games. This also means that the second place is really the worst possible one, as you don't get points, nor a rest.

Another way to play it is with selections and final. First you start with a number of selections in which everybody can compete. If you win a selection, you get a "ticket" to do the final. Everybody can compete in every selection, even if you already have a "ticket" to the final. You can compete every time to higher the chance of winning ones, or compete in one out of two selections, so that you have some rest in between. When you win a second ticket, you will have one opponent less in the final, as there is nobody else that has won it. And that means you have more chance to win the final, so it can be useful to stay competing if you already own a ticket.

Another variation is this: One starts and counts the catches. He has to stop without drops, otherwise he loses. Then the next one has to go for more catches, again without drops. And so on.

Massacre, Combat

Massacre is actually just the same than endurance, only here you have to make the others drop by any way. All the other rules stay the same. It is normally done with 3 clubs (as you can hit with them, run around).

As variants you can play war or stratego. For both you need to play in two teams. In war, the team that stays longest alive (even if it's just one juggler), wins.

In stratego, every team has a flag. If you make the flag of the other team drop (without throwing your clubs against his clubs), you win. The flag is a juggler that juggles one object more (lets say four clubs instead of three). The flag can go to another juggler by passing the fourth club to somebody else of the team (still having three clubs).

Volley club

Although I haven't written anything about passing in this book, I can't leave volley-club out of the games. To play volley-club, you need to master the six clubs passing quite well.

The game is very similar to beach volley. Search a field with a volley net or something like that. It's normally played two against two. Every player holds two clubs. One juggler juggles three clubs, two belong to him. The other one is the playing club and is thrown over the net to the other team. They need to catch the club (by throwing one of there clubs up, catching in the empty hand and juggle on with three clubs), and throw it back or pass it.

It's a bit easier if you may throw the play-club one time to yourself, but it's normally forbidden.

You can do other sports with clubs (or balls) on the same principle. Everybody holds two clubs, and there's one play club. Basket, Frisbee...

Pick a pattern

Whoever wants may show a site swap pattern to the others. The others have to guess as soon as possible what pattern it is. (If you see someone doing 56414 in Mill's mess, I can assure you, it's not simple anymore).

Of course there are a lot of other games possible, but the rules are usually quite trivial. Passing as far as possible, juggling as high as possible, trying to hit something, walking as far as possible into the sea while juggling,

Topic 2: Enlarge your skill, Improve your technique

Training advice:

22. While training technique, also improve creativity and knowledge.
    When training technique, you can keep being creative and keep thinking.
    If something drops, think why it dropped, and try to pick it up on a new way. Kick it up smash it up or what ever.

23. To improve your juggling technique, improve not purely your juggling skills, but improve your whole juggling. Do this by being aware of everything you do. The way you stand, the way you move, the way you look, the way you pick up, the way you train,…

24. Stand in a good position. That is:
    Stand straight up, straight back and legs, but relaxed and in balance.
    A simple way to do so is standing on your tips and then lowering slowly your heels until they reach the floor. You should stand straight and balanced now.
    Feel your body, be aware of it.
    Keep your shoulders low, and your elbows against your body, hands open.
    If you juggle, stand still. Don't dance or hop, don't move. Be in control, feel your muscles, be aware. Don't even hop up to make a high throw, stand still let your biceps work.
    If a ball drops way out, try to catch it by stretching an arm, not by bending your back.
    Do it. Throw a ball bad, and feel how far you can catch by stretching your arm.

25. Select what you want to train
    Try above all to enlarge your juggling possibilities. Practically, this means try to combine every component of tricks (throw variations, technique, movement, catches, patterns…) as much as possible by training all of them.
    This doesn't means that you have to train everything; more the opposite actually. Select carefully what you want and what you don't want to train, but select out of each component of juggling tricks. Selecting means planning. So plan, and write down.

26. Stop if you don't progress.
    When training things that are too hard, you don't progress. If you feel that you don't progress stop immediately. Think why, try to solve the problem. If you still don't progress stop training it. Train other stuff or decompose the difficulty and train on those things (see lesson 2):

27. To progress fast, train on simple (≠ easy) things.
    Basic patterns, high throws, doubled spinned clubs, backcrosses…. These things can look boring but they aren't really, as you feel yourself progressing.

28. Train left and right hand, left foot, right foot, head... Train all of them, enlarge your possibilities. Do it, I mean it.

29. Brake your records
    To motivate yourself when training boring things as the five ball cascade, counting and trying to break your record can help a lot.

30. Be a perfectionist on the long term.

Technical lessons

Lesson 1:

Throwing and catching technique

Before reading this, read what I say in the general advice about awareness, view and body posture. Start doing what I advise you there otherwise the rest is quite meaningless.

A good throwing technique has three constrains:
> 1) It has to result in fast and precise throws
>> This works best by throwing with the under-arm. Hold your wrist stiff and throw by bending your elbow. Let the biceps work, feel it.
> 2) It has to avoid collisions
>> Therefore you need to throw and catch on another place. The normal way to do so is catching on the outside, make a half circle down-inwards and throwing in the center, going back catching on the outside. This movement is called a throwing circle. Make them as large as possible. The more props you juggle, the more important they get. However try always to keep your elbows closely to your body.
> 3) It may not influence other throws.
>> In other words, your body needs to stand still while throwing. Don't hop up, don't bend your back. The same if you do a backcross don't move your head.

A good catching technique is the result of good throws. However, if props fly out, try to use only your arm, don't move or bend. Keep looking high where the ball peaks, and catch without following the ball all the way to your hand.
Throw one ball. After catching freeze, and feel if you'e still standing on both feet. You normally stand on the foot on the side of the last catch, because your shoulders tend to move with th e atching hand. Do,'t do this. Only the hand may move. Not the shoulders. Keep on training with one ball until this is good. Then the same while trhowing bad, while moving, …

Throwing clubs

Controlled slow spin

At first you normally let the club spin way too fast by throwing with your wrist. Try to hold your wrist stiff, and use almost only your elbow.
If the club is spinned too much, the wrist will have to bend after catching. That will decrease the spin precision of your next throw. Therefore, spin is a hard problem at first, but once you become a bit better, you'll have fewer problems with it. Try to stretch your wrist again as fast as possible, so that you can throw with a stretched wrist. If you throw with
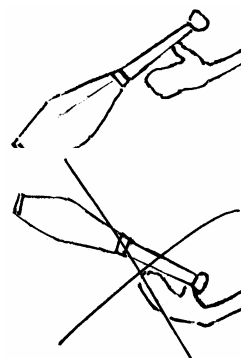
an (almost) stiff wrist the clubs will spin gently. For fast or other spin variations look at Part II: Chapter 1.

Doubles and triples
If you want to throw doubles (or triples), then again try to throw them without the wrist. They should spin twice because they stay twice as long in the air, not because they spin faster. Generally spoken, just try to throw your doubles as high as possible.

Cascade throws (to the other hand)
To perfection throwing technique (that is if you can already juggle at least all in doubles) work a lot on easy, simple things, but keep focused, try to throw every prop perfectly. Here are some exercises. If you do them, take your time. It only helps if you do it long and stay focused on perfection.

1) Juggle all doubles, 50 throws, all triples 50 throws,
2) Juggle three simples, three doubles three triples
3) Juggle S-S-S-S-D-S-S-S-D-S-S-D-S-D-D-S-D-S-S-D-S-S-S-D-S-S-S-S-D, and S-D-S-D-D-S-D-D-D-S-D-D-D-D-S….
4) Throw 20 flashes (55500) in doubles, 20 in triples, and then 20 in simples.
5) Throw 50 snake-throws (50505) in doubles, in triples, in simples
6) Juggle extremely binary (late throws, see more lesson 8), juggle extremely ternary.

Fountain throws (to the same hand)
The most important advice I can give on throwing club fountain throws, is that you have to "open" your pattern. This means that you hold and throw your clubs as illustrated. Keep your elbows against your body, arms straight in front of you, club-bodies pointing outwards.

Illustration: opening the four club fountain.

It's important that you don't throw your clubs in the nose plane, because as that they will easier collide and are harder to catch. If they are a little over-spinned, the end of the handle will bump on your forearm, and you won't catch the club.

You can do similar exercises as quoted above, but now starting out of the two-in-one-hand. Try not to spin and try to "open" the throws.

Lesson 2: Learning a new trick

Before you start learning a new trick, think. Do you really want to do it? Does it fit in your planning? Is it on your level?

Then, try to understand the trick, so that you can decompose its difficulty. Difficult things are always difficult because of several things. Try to find ways to train on those things separately. Search what exactly makes the trick difficult, then train on those things.

Decomposition of difficulty:

1) Complex tricks are before all difficult because they are complex. Al lot of things need to happen, too much to understand and especially following too fast on each other.
   It's not always necessary to understand exactly what will need to happen. At first, you only need to understand how to start. So focus on the first throw and make that throw. Do it until it gets natural, until you don't need to think about it anymore. Then focus on the second throw. Again until it gets natural, until you don't need full concentration anymore. Then go to the third throw,... Even if it takes you an hour to get to the next throw, you can learn Mills mess and Rubenstein's Revenge on one day. Just believe in it.

2) Not-complex tricks, as throwing a ball on your forehead, can also, always be decomposed into separate skills. Here for instance you need to throw the ball on a specific angle, move your head on a specific moment, and keep the ball in balance once it makes contact. So first train the balance, keep the ball on the head while moving, turning, running, then train the catch by laying the ball very fast on the head. Once that works, the throw itself will be doable.
   Another example is the 5 or 7 ball cascade; they are difficult because you need to throw all the balls fast, high and good, even if they were caught badly. So here the things to train on are patterns with lot's 5's or 7's.

However, don't decompose too simplistic to throw a backcross while juggling you don't only need to have a stable pattern, and a good backcross with one prop. The difficulty is neither of them, it are two other things. Firstly, the backcross needs to be done fast. So when training with one prop, train above all on doing it fast, do it realistic. Secondly, the hard thing is to avoid bending your back while throwing it, otherwise the backcross will interfere with the other throws. If you train on these two difficulties, your backcrosses will improve fast.

Lesson 3: Getting things fluent, stabile, perfect

As we all know, there's a very big difference between, succeeding a trick, and mastering the trick. I can't repeat it enough; first check your body position, the position of your hands and your view. Read more about this in his general advice given earlier. Read it and do it.
Mind that the goal for some tricks is to do them ones, and for others (patterns) to do them continuously.

The first type is things as a pirouette, a certain multiplex, a spectacular catch. To master them, they need to work the first time you try, that's all.
To train them, try to know perfectly what you need to do. Refer to other throws or catches or directions. The throw needs to be in this specific plane, and needs to spin a tiny bit more then a normal simple, and the catch movement should start when the props is exactly there,… Try to get it very sharply into your brain, what you need to attempt. This is especially important as the trick involved is one that needs to work on first attempt.
Always judge just after releasing the props, whether it will be good or not, and if not, is it too high, too far,… Once your trick works al lot, stop training it continuously. Do it ones, twice, then go back to other things. Come back on it, ones twice, then again do other things. (This to train that it would work on first attempt)

Patterns however are different. You want to keep them going a long time, preferably stable enough to do variations on it. Therefore work on two fronts
First try to get your patterns perfect. Search what exactly isn't fluent yet. Where do things go wrong? Every thing, not symmetric is bad. Detect it, or let others detect it and inspect others yourself. Is there a hand throwing higher, do you juggle slanting,…
Second try to train on specific problems by changing your pattern a bit (so go away from your ideal image). Train the pattern higher and lower, thin and wide, a spin more or less,… My five clubs for instance improved extremely fast by training too high and too low.

Here under is a list of frequent errors, and the normal way to correct them.

General correction

If something goes wrong, and it's always the same thing that happens (lets say, a ball flies backwards), the general way to correct it is very simple: try to throw the opposite of it. (So don't try to throw the ball perfectly, but try to throw it forwards)
It's a very simple rule, but it helps a lot. However it doesn't always help. This because the bad throw is sometimes caused by something else. Then it's not the bad throw that has to be corrected, but that something else.

Drops

If something drops, it always has a cause. The most common causes of drops and their solutions are explained below. If your problem isn't one of the following, if it's always another cause, then the problem will probably be precision. There's only one solution to that problem: Keep on training.

Mind that, when juggling you can chose to give more attention to the catches or to the throws. You can also give more time to the catches or to he throws. (juggling binary or ternary, see lesson 6)

Running forward

If you try not to throw forward, but your balls keep flying forward anyway, there are two possible solutions. First try to throw the opposite, try to throw backwards. Throw really far backwards.

If this method doesn't help to solve the problem, then it must have a structural cause. Mostly it is because you throw wrong throwing circles. To avoid collisions, you could throw the balls in front of each other, instead of keeping the hands in the shoulder plane.

If this is the case, learn correct throwing circles immediately. Do that, by throwing one or two balls with large throwing circles as explained in a previous lesson. It is easier, more beautiful and necessary to throw harder patterns to learn good throwing circles.
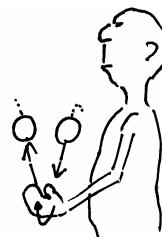
Collisions

Collisions are the worst nightmare of every juggler. You see it happening, but there's nothing you can do about it anymore. Especially with a lot of props, collisions are a big problem.

Collisions are generally avoided by throwing larger throwing circles. The larger the throwing circles are the more space between the props.
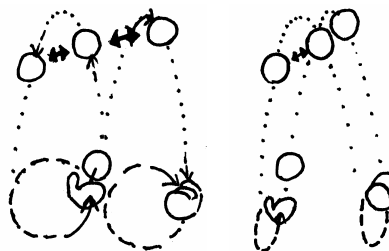
So throw a little higher and enlarge your throwing circles. The higher and faster you throw your props, the less space they have to avoid each other. Therefore to learn patterns with more balls, it will be very important that you master big throwing circles.

In fountain patterns, the chance on collisions increases a lot, because the space on the top of the flying-arc decreases a lot if throw small throwing circles. Therefore it is even more important to make large throwing circles.

Spinning around

If you juggle, it can happen that you're spinning around, and that you can't help it.
It's different for cascade patterns than for fountain patterns.

Cascade patterns:

To understand how to correct that, it is important that you know what causes this problem. Imagine that you throw a ball a little backward. You're other hand will have to reach backward to catch it, and it will move forward again to throw. That forward movement will make the ball fly a little bit forwards. Therefore, the first hand will

catch it again, a little too much forwards, move backwards again, and throw even more backwards.

If you look at the illustration, you can see that the throwing plane spins more than thirty degrees in just four throws.
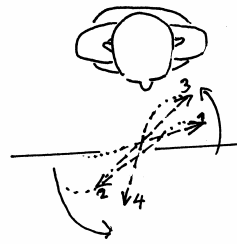
It is possible that the first throw was made a little forward and that the backward throws are the result of that, but that's less common because the response answer on a backward throw is larger.

So normally, to avoid spinning around, try to throw forward with the hand that catches a little forward. This correction isn't natural to do, and therefore, it is hard to stop spinning if you don't know that that is the answer.
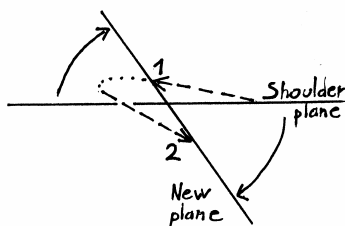
Reverse cascade patterns are a lot harder than normal cascades because they enlarge this effect a lot. If we look at the hands from above again, we can see that the spinning plane turns drastically if we throw a little bit wrong. The spinning plane changes with about the same angle in only two throws instead of four.

So, to improve your reverse cascade patterns, train above all on throwing perfectly in the right plane.

Fountain patterns:

In fountain patterns, spinning problems are rare. If it does occurs, it's usually dew to wider arcs on one side then the other.
If you're juggling two or three props in one hand, and you make a bad, not enough to the outside throw, the next prop will collide. It's natural to avoid that by spinning a bit to the inside, so that you create enough space for the following props.
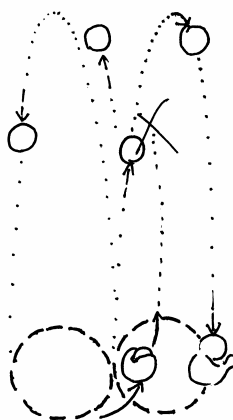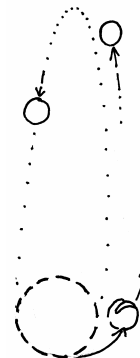
If you juggle two or three balls in both hands, you can't do that anymore. Otherwise the props would collide with those of the other hand. But if such a bad throw does happen, it is the only thing that you can do. So, you'll throw the next prop a little bit more to the inside, and throw a little more to the outside with the other hand.

This reaction on a bad throw makes you spin a bit towards your good hand. The bigger the throwing circles in the good hand are, the more you can stabile this.
So, if you spin towards your good hand, make both hands throwing circles bigger.

To avoid throwing too much too the inside, you can throw extra wide with your bad hand, but then the opposite will happen. If you throw a little too wide, you'll have to spin a bit towards your bad hand to be able to catch the bad prop.
So to avoid spinning towards your bad hand, make your bad hand throwing circles a bit smaller.

Speed and rhythm

If a pattern is too fast, throw it higher. It's as simple as that, but it's sometimes a hard decision because throwing higher requires more precision. And more precision requires more time to throw and more time to throw requires higher throws…

Don't be afraid of such an endless spiral. It's not endless. The little more time you get by throwing higher is normally sufficient to increase the precision enough. At the end it's always more beautiful to juggle high and slow then fast and low.

If one hand throws a little bit slower (or higher) than the other hand, you end up in a not perfectly AS pattern. This is a much worse problem in fountain than in cascade patterns. Correct it by trying to throw faster (and lower) with the hand that gets back, the rhythm will correct itself.

Mark that strange rhythms don't always have to be a problem. 53 and 534 with clubs in doubles for instance have a strange but enjoyable rhythm.

Solution to rhythm problems in site swap patterns can be a lot harder than what I've just discussed. There's a stability theory in the next chapter.

Juggling slanting

It's hard to correct this problem. The cause is hard to detect to. Normally it's because your best hand makes bigger throwing circles than your other hand, but there are other causes possible.

First try to stand straight up, and try to throw slanting to the other side. If that doesn't helps, the best exercise is to spin in the opposite direction. Once that works, if you stop spinning, your pattern should be central.
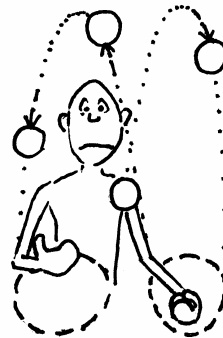
Lesson 4: controlling right and left hand separately

It is extremely important to be able to do different things in both hands on the same moment, or the one just after the other. Not only different, but exactly what you want, as good as if the other hand wouldn't be doing anything at all.

If you try to throw, on the same moment, with one hand exactly to a certain height, and with the other to another fixed height, it may seem extremely hard, almost impossible for you. However, it's not that difficult at all, it just seems that way because you're not used to it.

First warm up by doing the exercises I explain on to get aware of everything that happens around you.

Then try to catch two props on the same moment (each hand one). Throw so that the hands need to move to different places to catch (so not perfectly symmetric). And throw the one a bit higher than the other, so that you have to

catch one hand high, the other low to catch on the same moment. If you have a partner, play.

You'll notice that it's possible to let your both hands do a precise but different, job. Mind that actually you were doing more then two things on the same time, you were breathing and digesting. And you could do it while talking and walking. Our brain is capable of it, but it just isn't used to give two jobs separately.
Mind that a pianist gives ten jobs separately. Each finger needs to do a different job, but the brain manages it. So why wouldn't you manage two jobs?

To manage so, you need to try to give the two jobs on the same moment. Look, in your head, to both arms. It feels really strange I know. But try it, keep trying it.
Start with something easy, like two equal throws. Then a high and a lower throw. From here on you can try to combine everything you imagine.

Exercises to train different throws:

1 A high and an as low as possible throw. Keep the low one low!
2 Do the same, but after catching the low one, throw it directly again so that you can catch it a second time, on (or before) the high throw (84 00 04 00).
3 A normal and a back-cross throw. Mind especially the normal throw.
4 An arm normal, the other crossed under it.
5 Juggle two in one hand. Throw a third ball high, keep the pace with the other hand Do the same and try to throw the high one so that you catch it exactly on the same moment as the second ball of the two in one hand (so to height 6, read site swap theory)
6 With clubs: a fast spin double and a slow spin simple or normal spin and reverse spin…
When throwing fast after each other, the throws can still influence each other. Therefore try these ones too:
7 Throw high then low, catch the low one and then the high one.
8 Pop two balls (one in each hand) up really low (10 cm) but in a really fast pace. All of a sudden throw high with one hand, try to keep the same height and pace with the other hand.

Exercises to train different movements:

1 Live a whole day while juggling two balls in one hand. Change to the other hand when needed, but keep juggling, while walking, opening a door, taking a magazine, eating,… This is indeed an extreme exercise, but it's worth it, and it is fun if you do it together with other jugglers.
While juggling two in one hand, do these exercises with the other hand:
2 Try to follow one of the two balls up and down
3 Move your arm around a ball (or both), other direction … (see more chapter 3: 42).

4   Throw a 2 around the juggling arm.
5   Juggle the four ball fountain, but juggle fountain throws in one hand and column or reverse fountain in the other hand.

Lesson 5:

Throwing multiplexes

What's multiplex?

A **multiplex** is a throw in which more than one prop is thrown at the same moment out of one hand. **Duplex** means there are two props thrown, **triplex** means three…

If the props stay together in the air, and are caught together, they are called **couples**. If they split into two directions they are called **splits** ((5,4) f.e.). If they only differ in height, they are called **stilps** ((6,4) f.e.)
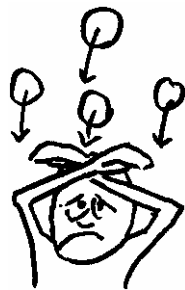
Multiplexes are very important in modern juggling. They are used to start patterns, or done continuously during patterns. They are so nice that juggling patterns continuous can be rare in modern juggling shows. Therefore the first part of this chapter is entirely about those starts and stops.

I would advise you to search multiplex starts for almost every pattern you want to do on stage. Especially for **three prop jugglers** it's important not to search for multiplex patterns, because you won't find much, but to search a lot on multiplex moves. Throwing two or three objects up, and catching them behind the back for example. Or just doing a multiplex to stop or start a pattern can be really interesting. It breaks the continuous and boring rhythm that exists if you throw the one pattern after the other.

Theory and techniques

If multiplexes are used for starts or stops, little theory is needed to understand or create new ones. It is however important that the props drop in the right rhythm. Synchronous patterns need synchronous drops for instance. It looks trivial, but often enough you see good jugglers that don't encounter this simple rule.
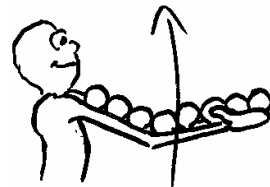
Getting two props in one hand

If multiplexes are used in patterns, more theory is needed. First, you need to end up with two are more props in one hand. To do so, with one hand, don't throw when you normally should throw, but keep on throwing with the other hand.

To catch a second **ball** in the same hand, try to catch the first one in the palm of your hand, so that the second can be caught in your fingers without needing time to make place for that second ball. Or do it the other way around, but make sure you don't aim to catch the first ball in the centre of the hand. It is a simple thing, but it helps a lot.

With **clubs**, how to do the second catch depends of the multiplex you want to throw after it.

How to throw duplexes

First train the basic multiplexes explained here. Then try others yourself. Behind the back, above the head, simples, doubles, triples,…

For multiplexes, always hold the balls/clubs very hard. Even if you need to hold a club on its very end, make sure that the clubs isn't free to move when you throw. To throw, release everything at once.

Mark

In the following paragraphs a height 3 or 5 will always be regarded as crossing, a height 4 as straight up. This is done merely for the simplicity of explaining. Ones you search patterns yourself, don't always throw the 5 crossing or the 4 straight up. Throw a (5,4) straight up for example as it was an (4,4) couple, juggle on and catch the 5 with an arm crossed under the other arm. Looking at multiplexes as that will make endless number of beautiful patterns possible.

On the other hand, it's of course important that you can throw a normal (5,4) too. So here's the explanation:

Sandwich throws (same height, different side (4x4, 6x6,...))

With **balls**, hold them next to each other in the hand (shoulder plane).

Normally the balls split enough, but with balls you can make them split some more by moving a finger up, between the balls when throwing. It feels awkward, but it works, and many patterns look a lot better if the multiplex splits wide.
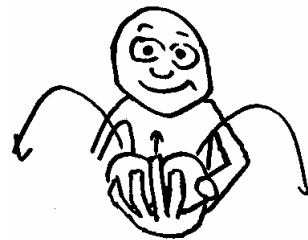
With **clubs**, you need to hold the clubs so that the bodies of the clubs lay horizontal next to each other when you throw. That's normally done by using the circusgrip (illustration left).
This means you lay/catch the second club on the thumb side instead of on the fingers side as for normal grip. While juggling you can catch with the thumb, or catch the second with the fingers, but under the first club (illustration right).
However with a normal grip, you can twist your hand and also get the body's horizontal, which will make them split nicely.

Wrong illustration

Stilps, high and low to one side ((5,3), (6,4), (7,3) …)

If a prop flies higher than another prop, it's because it had more speed when releasing it. If you put one ball in front of the other, that will happen, because one is further away from the rotation point.
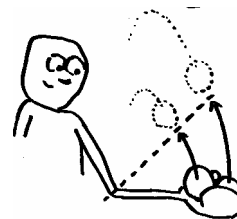
Normally, you will want them to differ a lot in height, so that the low one can already be thrown up again before the high one has to be caught. To do so, there are 2 things you can do.
First you can throw with the wrist instead of the elbow, which makes the rotation point get closer to the props and thereby the speed difference increases.
Second you can enlarge the distance between the 2 props (see left).
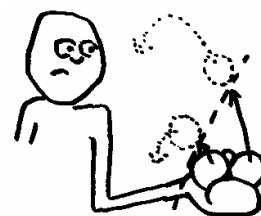
With **balls** the wrist throw is usually enough to throw (5,3) or (6,4), however, if you can enlarge the distance. That will get things smoother. Try to keep the low ball as low as possible. If you have time before the throw, it will help also to enlarge the difference.
If you want to throw extreme height differences (6,3), (7,3), (8,4) or so, then do the following thing. Release the high ball first, stop throwing, and then, a

split second later, and release the low ball. It's unnatural, but it works really well.

With **clubs** above all enlarge the distance. Hold one club as close as possible, the other as far as possible. Make sure that the far one is held strongly, between thumb and the stretched index. (You don't need to hold them circus as the high one is too high to collide with the low one).
You can also hold them not so far out of each other, and you the wrist throw, but then they will spin very fast.
If the high club flies forward, then only release the clubs when they are more vertical by holding them loner or twisting the wrist a bit more.

Couples (**Balls**, to the same side on about the same height)

In couple throws the balls fly just above each other, so that you can catch them in one catch. When throwing couples, you'll need to reduce the height difference.
The techniques to do so are very similar to those used to reduce spin in club juggling. This because both problems are due to the same cause.
Bending the wrist a bit while throwing is generally applicable (the illustration is exaggerated, they shouldn't fly exactly to the same height). Giving the closest prop an extra push is also possible, but I don't advise you to do so.
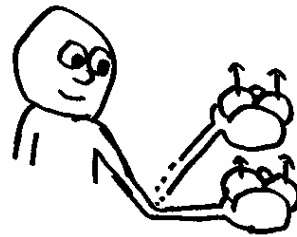
Glue's (*balls*)

A Glue is a very hard throw in which the balls stay next to each other, and are caught in one hand. To be able to catch the balls in one hand the balls may only split a tiny little bit. The method to do so, is trying not to give any pressure at all on the balls when releasing them. Further to make it possible, the throw needs to be low, but it will still be very hard.
It is only worth the effort (and risk) if you stress it with a juggling stop before it (and it gets doable as this to). It can be done with 2 are 3 balls. If you try a glue, always know very well how you will catch it. Which ball with which finger.

Some classic ones triplex are:
- Low 333 to the other hand
- Twist your hand, fingers first inwards. Twist on until you can't go further. Your fingers should be pointing out-forward. No make a little throw (222), twist back to normal and catch them all three in the same hand.
- Triplex snap. It's harder than you would expect.
- Triplex drop, as in the machine, but now three balls
- Throw them all three as if you would throw one to do a back catch in the same hand. Catch the two of them in your other hand, above the opposite shoulder, arm behind the head. Catch the third with the throwing hand as a back catch.

Tricks as this last one seem impossible until you see them done. It's only when you have seen them that you keep trying long enough until it works ones.

Splits: to different heights and to different hands ((5,4), (4,3,), (6x,4),...)

a) Nose plane throw (normal throws)

With **balls** combine the technique for stilps to different heights and splits to the same height. So put one ball further and aside of the other. To make the balls split more, use the techniques explained below.

With **clubs** throw a normal stilp, towards the center and catch there with both hands. It's possible to let the clubs split nicely but it's hard and fragile. Therefore I recommend you to use

the techniques explained below. To make them split out of a normal throw, give a little twist with the forearm just before releasing them. The twist will make the high throw (more than the low one) fly towards you twist.

b) Dip throw

A dip throw is the natural throw to throw a high fountain and a low cascade throw (4,3 6,5 6,4x …).

With **balls** hold the props next to each other and twist the forearm a little bit while throwing as in a dip throw. The centre prop should fly highest, as a fountain throw. If the balls fly to about the same height, it's mostly because you twist you hand too much.

With **clubs**, hold the clubs as for a stilp, and throw a dip throw.
Naturally you'll end up with a high fountain and a low cascade throw ((4,3) or (6,4x)). If you release earlier, and thereby almost don't twist, both clubs will go to the same side. If you release even earlier and keep on twisting while releasing you can even get the high club crossing and the low one not crossing ((4x,2) or (5,4)).

b) Reverse dip throw

The reverse dip throw is the natural throw to throw a high cascade and a low fountain throw.
With **balls**, hold them next to each other and twist the forearm as in a reverse dip throw.
The centre prop should fly lowest, as the fountain throw. If not it's probably because you twist the arm way too much.
The faster you twist, the more they'll differ in height. The more you twist before releasing, the more they will split.
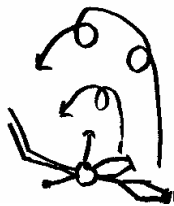
With **clubs**, hold the clubs as for a stilp, but throw a reverse dip. Naturally you'll end up with a high cascade and a low fountain throw. As for the dip, by releasing earlier you can make the clubs go towards the same side or even make the high one a fountain and the low one a cascade throw.

Lesson 6:

Binary en ternary juggling: making pauses and holes, slowing down, dwell time

A pause is a moment on which a ball is held in a hand without needing to throw it in order to catch an incoming prop. As you can do a lot with the prop on that moment, making pauses is the key to many variations. Holes are less useful, but needed for some other variations.

For both it is useful (but not really necessary) to throw quite high, so that you start with a quite slow pace.
While juggling your hands have a holding time (=dwell time) between catching and throwing, and a catching time between throwing and catching. In a normal pace, the holding time is a bit longer then the catching time. But what happens if we try to change that?

1) Creating more holding time = more dwell time = juggling binary = making pauses = slowing the pace down
    (Mark that if there are so many expressions to say the same, it must be important)

First you can try to hold the prop as long as possible before throwing it. The holding time is maximal and the catching time is minimal. If you keep throwing to the same height, you will notice that the pace of juggling slows down.
So two things happen, you get a longer holding time, more or less a pause and you get a slower pace. This is extremely important.

At the maximum, the longer holding time becomes a full pause, so you juggle a 4x2 pattern (see synchronous theory) but on a height 3. This means that you can do every trick you want in which you need pauses by increasing the holding time. With clubs that means that the 4x2 variations in doubles are actually possible in slow simgles.
On the other hand, you can juggle low, without having the impressing of juggling very fast. This because you don't juggle very fast (the pace goes down) and because you keep long holding time, so you can throw quite slowly. This is called making time.
Slowing the pace down can be addicting, but mind that the catching time is reduced. That means that although you may feel more relaxed juggling five balls with long holding time, your catching time is reduced, and that makes a bad catch or a drop happen faster. So if you want to win endurances, then don't go too far on it, keep enough catching time.

2) Increasing catching time, juggling ternary, making holes

If you do the opposite, if you try to throw as soon as you catch, you'll increase the catching time. This is hard to do. The pace must keep regular. It's not throwing all your balls up and then waiting until they come down (a flash).
Juggle high (I mean high throws), and while keeping the same height, try to throw faster and faster, throw by throw. The pace will go up, but keep regular. Feel those empty hands, enjoy the strange feeling.

Mind that the whole is only half as long as the pause (if you juggle the same height). So to create a full whole (a zero) you'll need to throw higher (6x0 in stead of 4x2, read synchronous theory).

As the pace goes up, it's less interesting than the previous exercise, however it is needed in variations where you need little hole's. Back-catches and ultimate under the other arm catch for instance.

Topic 3: **Enlarge your creativity**

Creativity is a very badly understood thing, because most creative people can explain little about it. Therefore it seems a divine thing that some of us or born with, and others not. Believe me, it's quite different than it seems. Some are better at it than others, but everybody can improve and even learn it.

Creativity is nothing more than the power to make interesting things. And that power is nothing more than selection. It is selecting out of an endless number of possibilities such a combination of things that is interesting.

The thing is, to do so; you need a support, to canalize your creativity. You need a frame to work in, that's all. I'll give you some possible frames to work in. After a while, you should work without noticing the frame, as if it wasn't there anymore. Most creative people cannot explain anything about how to be creative. They don't realize how the process works. However in analyzing how they work, you always come up with frames, mostly lots of them. They have a starting point or a goal, a way of building ideas up, and selecting.

Then what is the best creative frame for a juggler? The perfect frame exists. It is the combination of all the frames, even the bad ones. And it works best if you don't realize that you're using it.

To improve your creativity, my central advice is to create as much as you can, and secondly to create in other frames, other methods and exercises.

The exercises below give you different frames. Some like more organic things, others more mathematical things.

Training advice:

31. Make sure there's a good ambience to create
    - First of all believe in yourself. Always try to do your best. And always be proud on what you do, even if the result sucks.
    - Be focused but relaxed. Friends, good music, and some illegal things can help to get relaxed, but to get focused too, relaxation exercises can be better. You can do whatever you want, close your eyes, shut up, yoga, stretching exercises,… Juggling technical things is focusing and relaxing to, but it will push you into technical directions when creating. Be aware of that. Solutions will be found with your hands, by catching and throwing, your creativity may drown in difficulty. Be aware of that. I don't reject it, but you have to be aware of it.
    - Give yourself space when you practice.
    - Training together with friends, in juggling clubs, on conventions, can be motivating and it can be useful to know whether your creations or worth something.

32. The best idea is the easiest one.
    Don't search difficulty, avoid it. Use your creativity not your skill to find answers to your problems.
    What ever routine you make, there will be enough difficult things to astonish the audience. A good routine has some technical, highlights, and nice creative results in between. This makes the line of tension high and teethed, while a non stop difficult thing is boring for every non-juggler, and for a lot of jugglers.

33. Create a lot.
    Even if the result sucks, be glad. Creating will make your next creations better. If you only want to make perfect things, you will get stuck into some ideas, and the result will be boring.

34. Enlarge your possibilities
    Creating is selecting. The more things out of which you can select, the more interesting possibilities there will be.

So train on knee catches, head balances, shoulder catches, pirouettes, contact tricks,…

35. Get a wide view

Creating is selecting, choosing out of all the possibilities those who are, interesting. The wider your view is, the more possibilities you consider, the more interesting possibilities there will be.

Try always to find a new answer. Explore all the possibilities there are with a prop a body and a floor. A prop can be blocked, rolled, balanced, thrown, catched, dropped, bounced. You can do so with your hands, head, feet,...

Two simple things to widen your view are these:
1) Take any trick you want, and do the opposite. Try to search everything that could be reversed. (Direction, spin, plane,...)
2) Limit your possibilities extremely, and search in that really small space what is possible, expand the possibilities gradually. See for an example in lesson 9: Jam-session and lesson 2.

36. Do a lot of research (and write good findings down) on tricks and moves.

Limit your possibilities and search out of there.

Take one ball and try to find out what's possible with it. How, and with what limb can you catch it. Where can you balance it? How can you pick it up?

Take one skill, lets say balancing a club, and search how and where you can try it. How can you get it there, and how can you get out of it?

Take one movement, let's say a half pirouette. Search different ways to turn. How can the ball move when you turn, Give it, throw it, bounce it, roll it,…

Take one element of space, let's say height.

Take one position, let's say holding three balls blocked between your legs, and search how to get into and out of that position. Search how to move while…

Take one trick, search …

37. Work on, on the ideas of your research (and write findings down), turn them into tricks.

How could you do that catch when juggling?

How can you do that with 3 clubs?

38. Search on tricks, make routines

Put movement into tricks or put tricks on movements

Search stops and starts for tricks.

Get more expression in the trick: do it big, are afraid, with anger or joy.

Search passages from one trick to another.

39. Look at yourself.

Use camera, mirrors or friends (performers or jugglers) to get feed back.

40. Look at others

Good and less good jugglers (or other performers). Look at how. Try to see how they have come to their result. What makes it strong, what weak? Question them if possible.

11. Create with short deathlines.

Deathliness make it easier to chose and go on. This is very important. You can keep on searching but it is important to choose. To will help you create more, and that will help you on the long term to create better stuff.

Lessons, frames:

In the training advice I just gave, I already set up a frame in which you can work. In the following lessons I give some more ideas for interesting exercises. Every exercise comes best to its right, if you do it with some people together, and look at each others results afterwards. You can do these exercises over and over again. Always work with deathlines.

Lesson 7: Possibilities to make tricks:

Mark that you will find lots of tricks while doing research as I explained higher, these are all just variations on that theme.

Take a problem, search solutions to it
> Example 1: Search five (new) ways to pick up a club from the floor (tap, kick, roll, turn …). Remember, the best idea is the easiest one. Try not to find five very good ones, but five as different as possible ones.
> Example 2: Three props come down on the same moment.

Take two positions, and search ways to go from the one to the other
> Example: You've got three balls in your left hand; get them in your right hand. Again, search five solutions.
> Mark that this is an exercises you need to do constantly when making a routine...

Take two things and search a combination
> Example 1: A pirouette and letting a ball drop
> Example 2: Two clubs and arms crossed

Take an idea, and try to make a trick out of it.
> It's best to create the whole trick in your mind before juggling. Start with your idea, and find out what needs to be done to do it, and what the consequences will be. Simple answers to popular needs (three props):
> You need pauses in one hand: juggle two-in-one in the other, or make a high throw.
> You need pauses in both hands: throw one prop high
> You need holes in both hands: throw three balls high
> If it gets too complicated, I advise you to use the trick-creator I explain in the next chapter.

Play jugglonary:
> Express a word by juggling tricks. You can play in teams of ball jugglers against club jugglers or diabolo jugglers.

Lesson 8: Possibilities to work with tricks

Take a trick and add something
> Add two movements, one that fits and one that contrasts
> Change your body position, again a fitting, and a contrasting position. Try to search for little changes. What if your foot would…?
> Add a certain expression; again, a fitting and a contrasting one.

Take a trick and forbid something
> Do the same, but without hands, search different solutions
> Do the same, but without throwing

Take any trick and do the opposite

Search as much opposite's as possible. Everything can be different, the height, speed, feeling, movement, direction, sound, spin-direction, which hand, which end of the club, the number of props,… This exercise is ideal to widen your view.

Take a trick you do with one prop.
Do it with two, three, four, five props (no matter if you can juggle five or not) and without props. Just search how you could solve the new problems.

Take any trick
Try to put its character into a name. (Machine, rainbow, stone, water, sick, …). Then do the exercise and try to express its name as good as you can.
I like this exercise to let tricks live.

Tricks can come out of routines
While making routines you'll find solutions to problems which can be nice moves. For more see lesson 10.

Lesson 9: Possibilities to make routines

Routines do not have to start out of complete tricks; they can also grow while using new and old ideas. It's important to make lots of routines, to create ever new ones, therefore deathlines help.

The basic idea:
Try make things run fluently into each other while combining as much opposites as possible. Combine fast and slow movement and stop, floor and air, frontal-silhouette, straight- spinning, big-small, eye contact and no eye contact, stop-start., high-low, sad-happy. Those opposites will create a high and teethed line of tension.
Try to get the whole picture of it. There are always, props, a body and a space. Work with all three of them, always.

Exercises:

1) Free routine out of the blue
Take something easy; one ball or two clubs or so.
Improvise a routine, move after move.
Only allow doable things, don't fall into difficult things. The best idea is the easiest.
Set a deadline. In 10 minutes, you need a routine which you could show. Don't forget what you have, repeat it from the start, go on.
Perform it. Even if you're alone. Take a deep breath and do it, the whole thing, don't stop, go from start to end, as if on stage. Go on if it drops.

2) Variations on the free routine out of the blue
Do the same but chose another prop or number (take two balls or 1 club now, gradually go more difficult)
Now give special attention to one of the next things: Your start, your stop, what you do when a thing drops, your body, movement.
After doing those, you can do the same, but with special attention to one of the contrasts I've summed up in the basic idea of making a routine.

3) Routine starting from positions (Ring-show)
Take a few positions. That is possibilities to hold your balls. (You can block them some where, hold your hands somewhere, balance them somewhere, and stand in a certain position)
Number the positions

Search a passage between every position (from 1 to 2, from 2 to 3 … from the last to 1)

If you are with a number of jugglers you can make one routine together. Each of you can search owards a position of an other one.

4) Routine starting from tricks

You can do the same, but now starting from certain tricks instead of positions. This is a way to make a routine very fast. The result however gets boring very easily, as it is natural to take your nicest tricks, and as the result will be more a technical demonstration than a creative and interesting thing.

Therefore I only advise this way of working as an exercise; when trying to make a real show, use this method only in combination with other methods.

5) Routines starting from movements

Exactly the same, but now start from a series of movements. Walk straight, turn, go down, half pirouette, walk side ways, stand still, jump…

6) Routines out of ideas, constraints, …

Combine all movements in one plane.

Go from 5 to 4 to 3 … objects

7) Jam-session

A jam session is a free improvisation, with more than one juggler. Here, it is not the goal to come to a routine, a result. It's about feeling each other. Here is a nice way to learn it.

1) Two jugglers, one ball
2) Stand in front of each other; keep the four hands on the corners of a rectangle hanging on an imaginary wall between you.
3) The hands may only move from one corner to another. Play with the ball. Throw it; drop it to your partner or to yourself. Move the hands. Two on a corner, all up, one under, arms crossed,..
4) Now we will gradually allow more possibilities, you can go to the next step every time you feel ready. Search for new possibilities every time. Steps:
   Hands can move inside the rectangle too.
   The rectangle goes from the floor to the ceiling (mind that it stays flat), keep playing, pass or don't pass, move
   The rectangle becomes a whole wall between you. Try to move, both with and without the ball. Cross each other. Keep moving when you don't get a pass when you had expected one. Just move on.
   Finally, use the whole space. Keep searching for new things. Close to each other, far, in front, behind, fast-slow, … Play, improvise and feel each other.
5) You can add stops if you want. Whenever there is a good moment to stop (a nice catch for example), you can freeze. Try to feel that moment so that you both freeze on the same moment.

You can do jam sessions with more persons, more props, more fun. Every one two balls and one person 3 is an easy situation.

8) Learn and teach each other's routines

Learning a routine of some else gives you new ideas and material.

Lesson 10: Working on routines

I don't like the idea of making a bad routine and then working on it to make it better. It is more taking good routines, and allowing new research to change them. It's about, daring to "kill your darlings". The following exercises are more meant to learn something than to create good routines.

Exercises:

Change an element

Take an easy routine, with about five tricks.

Forget all the movement and put an entire new movement on it.

Do the same with: expression-emotion, starts and stops, the order of the tricks, floor-air, high-low.

Change the number of props

Make a stupid one ball routine (really simple and stupid).

Now take 2, 3, 4 or 5 balls or clubs and try to do the same sequence. Avoid any cascade or train pattern … go for multiplexes or blocks instead.

Topic 4: Enlarge your knowledge

Training advise

41. Always think

No matter if you are a theoretically minded number freak, or a Sunday afternoon park juggler. Always think why and how. This will make you progress a lot faster. Believe that you can find answers.

42. Write down.

If not, you'll forget just about everything you think.

43. Learn by all means possible

Watch, listen and read. Think about what those sources tell.

Don't be afraid of reading theory. A good theory is made to help

Theories, facts, concepts :

Lesson 11: What is site swap theory about, and why learning it ?

The site swap theory is something as music notes for jugglers. Of course it it's not necessary to use theory to juggle, but it can help a lot. It may look boring to learn theory in your spare time, but I can assure you that it isn't as boring as any other theory, and that it's actually quite simple. To convince you to read it, I've written some arguments in the text below.

As it is so important to understand site swap a bit, there's a very practical lesson on the end. A learn-while-throwing lesson.

First, it was created to discover new patterns. And therefore, **it makes you able to create patterns yourself**. The number of new patterns that can be discovered is enormous. For instance, if we only allow asynchronous (no throws with two hands on the same moment) patterns without styles, (that is without weaves, barrages, backcrosses, mills mess…) or multiplexes (throwing more balls out of one hand) up to height nine (the height of a nine ball pattern), we can find about 29000 patterns with four balls. Of course most of them are

complete shit. Still it leaves us with more than hundred interesting four-ball patterns which could be juggled in various styles and variations like backcrosses, barrages, Mills Mess…

Second, the site swap theory will **enlarge your insight in juggling patterns**. For example, it is possible to juggle a three-ball Burke's Barrage without understanding what is going on. But what happens if you want to juggle Burke's Barrage with four balls, and if you want to do it with clubs?

Third, it isn't possible **to explain difficult tricks** to readers that don't understand Site Swap. And if possible, the explanation needed would be huge.

Fourth it can be **applied on every aspect of juggling**. Balls, rings, clubs, passing, rebound, multiplex… Therefore it is always useful.

Fifth it will **improve some of the tricks** you can already do, but not very well. A short checking will teach you that the half shower with four balls gets smoothly asynchronous if one hand throws to height 5 and the other to height 3, and not 5 and 4 which is a natural fault.

Sixth it will teach you lots of patterns that help **to learn more difficult stuff**. Five balls can be learned by throwing patterns with a lot of 5's in it. 5-5-5-0-0, 5-0-5-0-5, 5-5-2, 5-5-5-1 will all help you.

Seventh it is a way of **communicating for jugglers**. In magazines and on Internet you can find lots of ideas, mostly explained in site swap language.

Eighth it is **a memory support**. New invented tricks easily get forgotten. If you can write them down, you will never have to juggle hours to find that trick you ones could do.

I hope that I have convinced you to learn the Site Swap theory, I really do.

Many jugglers don't like Site Swap. That has several reasons. Some don't like the combination of theory and juggling. Others think that the Site Swap theory is not good enough, that it can't explain enough, and that it doesn't say anything about Mills Mess or multiplex. Those arguments belong to the past. Site Swap is a young "science", of course it didn't cover those hard problems at first, but it developed fast. The extra theory to describe multiplex, Mills Mess… is given when those tricks are explained.

The theory will show what is possible, but it will always stay the juggler himself that has to create tricks as interesting as possible.

Lesson 12: Short theory and exercises

Here I give an extremely short explanation of the theory. It's not completely correct, and it's only about asynchronous patterns, without multiplexes, styles,… That will come, but lets start simple.

A pattern is written down as a string of numbers, in which every number stands for the height of the throws.
Example: 534 (read: five three four, and not five hundred thirty four).

You throw those heights as this:
0 = an empty hand for one moment = a hole
1 = fast straight throw to the other hand = snap, as in the shower.
2 = hold a ball for one moment = a pause
3 = little throw to the other hand, as juggling three balls
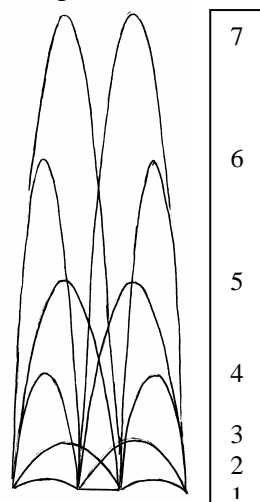
4 = throw to the same hand, as when juggling four balls
5 = high throw to the other hand, as in five balls
6 = …
So every even height is thrown straight up, every odd height towards the other hand.

Every pattern must fulfill the following rule:

The average of the heights = the number of props involved

You juggle the pattern by throwing the heights, alternating right and left.

Ex.: The average of 534 is 4 (average = add all the numbers and divide by how much numbers there are, so (5+3+4)/3 = 4). So it can be juggled with 4 balls, and you have to throw with right high to the other hand, then low with left to right, then right hand straight up, then left high to right, right low to left and left straight up. …

And now we juggle. Take three balls. Try to juggle the following patterns one by one. To do so, **always first think how much props are needed**, then, try to understand what you need to do, and then do it. The rhythm of throwing is fast as you normally juggle, so more or less as fast as you can. Mark that this is a lot faster than you can think, so first think what you will need to do, and then do it. It helps to train throw by throw. First only the first, then the first and second throw, then the first three…
The purpose is that **you look at the pattern, then think what needs to happen and then try to juggle it**. Try until you think that you can do it, or until you get really stuck. **Only then look at the explanation**

1) 31

It's juggled with 2 balls. Right throws to left, left snaps into right, right catches and left catches. Then the same repeats, right hand throws the other snaps. Such patterns, in which one hand always snaps, are called showers. (other showers: 5111, 51, 7131, 717111, 71 …)

2) 312

Again, two balls. Start the same, but then instead of throwing again, the right hand takes a pause, and **it is left that starts** with a throw to left and right that snaps,…
If a patterns has an odd number of throws it always **changes hands.** This makes it symmetric, and therefore more beautiful, but more difficult.

3) 411

Again two balls. Right throws straight up, a bit high. Directly after, left snap into right, and right snaps directly back, left catches and only then right catches the high throw. **Then the same on the other side**. Do everything fast. There are never two balls in one hand. While one is in the air above a hand, a ball gets in and out of that hand.

4) 4233

Watch out, three balls. This pattern is actually juggling the three ball cascade, but after two throws, throwing straight up ones, doing nothing with the other hand and then continuing.
If you succeed, you can try 423 and 42333 to.
As 4233 has a pare length it doesn't switches hands, while the two last ones did. To train symmetric patterns you can (usually) ad a basic height (with three balls that's 3), and train the non-symmetric first. (So 4233 helps to learn 423 and 42333)

5) 501

Two balls again. This one is tricky. As the second throw is a zero, you're left hand needs to be empty (this isn't fully true, longer story later, high state patterns)). So start with two in one hand. Again you will need to do everything fast, very fast. Throw high to the other hand, then snap to that other hand, now, before catching the high ball, throw the caught ball back, high to the first hand, catch and snap to that hand… If it doesn't works, throw higher and faster, however this pattern keeps feeling strange

6) 52512

This is the last exercise for this lesson. If you master this one, you can understand every pattern. Throw high with right to left, then again with right the same, snap with left to right, catch and throw back high to right, catch and do the same, …

Some other simple patterns you can try: 41401, 5111, 522, 4413, 4512, and 55113

If you can do these patterns, believe me you can put every basic pattern into reality, and the only thing you need to really juggle it is training. Really I'm serious this is all there is to it. All the rest about site swap and juggle theory is 95 percent for theoretical nerds. Although those 5 remaining percents may be interesting …

Lesson 13: A longer story about asynchronous site swap

In the Site Swap theory (SS) a pattern is reduced to the bare minimum in order to simplify the system. As we have noticed in the previous lesson, if we throw alternating right and left, the mere indication of the number of counts that a ball stays in the air[1] is enough to know what to do. (even number of counts means to the same hand, odd, means to the other hand, as they are throwing alterningly). That number ofcounts is called "the height" as both are linked.

[1] actually it is the number of counts before it can be thrown again, so that is the number of air counts + 1, cause you also need a count to make the throw.

Even heights stay in the same hand:


```
      2            4            6
R     L     R     L     R     L     R     L     R     L
```
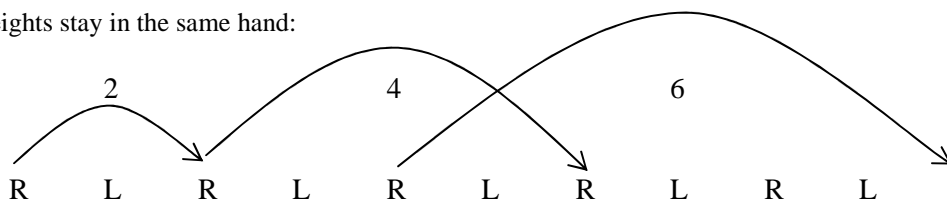
Odd heights switch hand:


```
      1            3            5            7
R     L     R     L     R     L     R     L     R     L
```
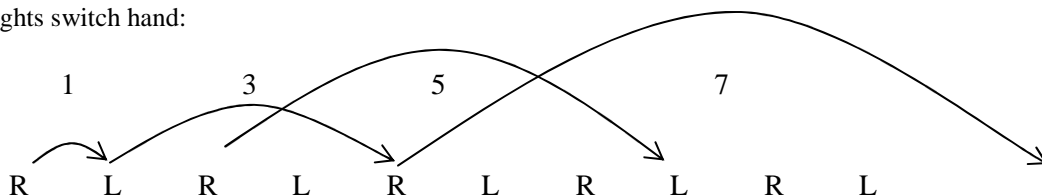
How to throw those heights?

As a height is actually a time, a number of counts, the actual height depends of the speed on which you juggle. However their relation always stays the same (unless you change holding time and so)

If a ball stays twice as long in the air than another one, it will be thrown much higher than twice as high. Therefore height 6 is much higher than twice height 3 (it follows more or less this formula: real height = C_v x (height-holding time)²).
The following image illustrates the relative height of the heights. However the exact height on which they have to be thrown depends of the speed you juggle on. The faster you juggle, the lower the throws need to be. This is called height reduction.

The following table shows the mathematical relation between the throws. (Holding time = 1,3 catching time = 0,7)

	4	5	6	7	8	9	10
3	2,5	4,7	7,5	11	15	20	26
4	1	2	3	4,5	6	8	10
5		1	1,6	2,4	3,3	4,3	5,5
6			1	1,5	2	2,7	3,5
7				1	1,4	1,8	2,3
8					1	1,3	1,7
9						1	1,3
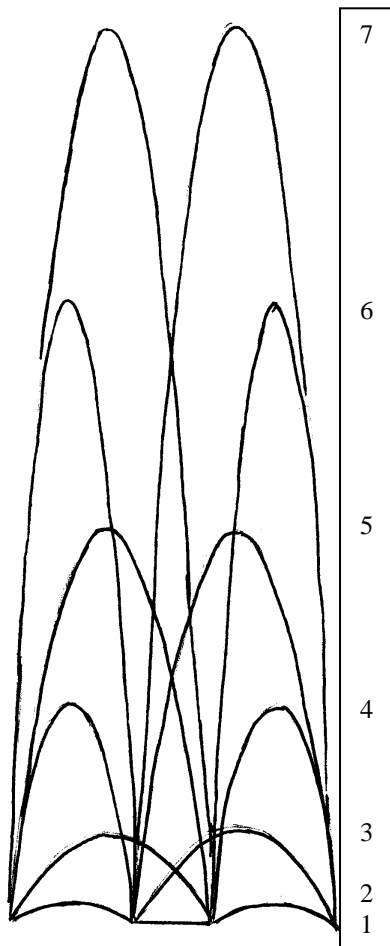
It isn't simple to know when you throw just twice or 4,7 times as high.
Therefore try this:

Balls and rings

If you can't juggle four balls you will only need heights up to height five. If you have problems, make the difference between high and low throws larger (and speed up), cause that is normally the problem.

This will help a lot if you can juggle four balls:

Height 3 is a fast three-ball cascade, problems always arise because they are thrown too high. In patterns in which you have to throw one high ball, followed by some low ones (633 Fe), it's much more important to throw low, fast 3's than to throw the high throw very high.
Height 4 is a low four-ball fountain height.
Height 5: juggle an asynchronous four-ball cascade, then throw one ball higher (about twice as high) and straight up. If you end up in a synchronous pattern the height was height 5. It's possible to correct the height a bit by catching it higher or lower. It's natural to catch the 5 a little higher (earlier) than normal, so that you stay asynchronous. Be aware of that, and do the opposite if you want to switch to synchronous. (While doing this, make sure that the other throws stay on there normal height 4).

Height 6: throw even higher. So that you stay Synch, or Asynch.
Height 7: Throw still higher and switch to synch (asynch.)
…

Clubs

Club jugglers were by far the hardest to convince that Site swap theory is interesting. It has several reasons. Site swap notation doesn't say much about how a throw is made. If a ball flies, it flies. A club however can fly on various ways. And it are those throw variations that make club juggling interesting. Further, it is true that site swap is most useful if you juggle more then three objects, again for club jugglers it isn't that simple to throw four or five club patterns.
Still it stays more than interesting enough to learn it (passing patterns use it too). Therefore more and more club jugglers juggle site swap patterns.

Normally this would be correct:
>3 is a simple
>4 is a double
>5 is a triple
>6 is a quad

But reducing the number of spins results in easier, more elegant or faster patterns. Five clubs for example will normally always be juggled in doubles because triples give the same speed as a normal three club cascade. It is of course possible to juggle faster than that. Therefore high doubles will normally be used. The slow spin gives the whole pattern a more elegant look and the doubles make it easier.
With reduced spin this gives

>3 is a fast simple
>4 is a slow simple
>5 is a slow double
>6 is a slow triple or very slow double
>7 is a very slow triple

(See more Part Two Chapter 2: basic patterns)

When is such a string possible to juggle ?

A pattern is only legal if it fulfils both following rules:

Rule 1:

The average of the heights in a string is the number of props you juggle with.

If the average is 3,33 it is of course not possible to juggle that pattern. Therefore the pattern 334 isn't possible to juggle ((3+3+4)/3 = 3,33). 3342 however is possible ((3+3+4+2)/4= 3), and is juggled with three props.

Rule 2

Two props can never come down on the same moment.

This is easy to understand. No matter how good you can juggle you will always need to correct your throws a bit by moving your hand in order to catch a ball. If two balls come down at the very same moment, your hand won't be able to catch both balls. (if you really want,of course

you could, look at stuff of Luke Burrage for instance, but generally spoken, you don't want it to happen (and you don't want to look like Luke Burrage)

You can check if two balls will come down at the same moment on several ways.
You can ad the count on which the throw is made to the height. If then all the numbers are different, they come down on a different moment.

F.e.:   3333 becomes 3+0 3+1 3+2 3+3 = 3456, so 3333 is possible to juggle, .
        342 becomes 3+0 4+1 2+2 = 354 , so 342 is possible to juggle.
        432 becomes 4+0 3+1 2+2 = 444, so 432 isn't possible to juggle.
        4 0 5 becomes 4 1 7 7 4 10 , so 4 0 5 isn't possible to juggle.

A second method is more or less the same: Draw an arrow from the throw to where it will descend. Two arrows may never come down on the same count.

F.e.:
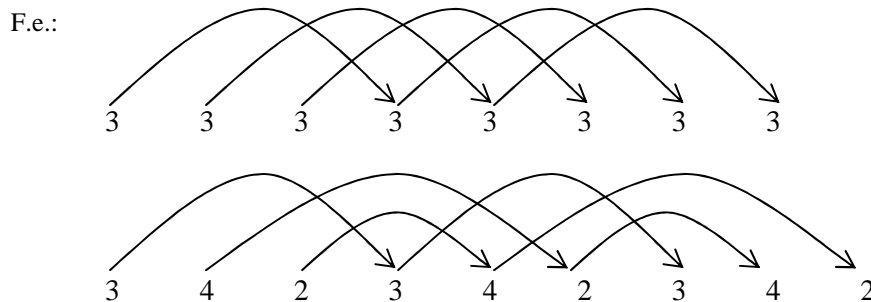
Extra notation mark

42(3) means: juggle 42 (two in one hand ones while juggling the three ball cascade.
(4,3)23 is a multiplex pattern. See more lesson 5 and chapter 6.

Additional rules

These are rules that aren't necessary to know, but they are useful to know. They may tell you what will be a beautiful pattern. That will save you time.

1) *Patterns that have an odd cell length change hands (are symmetric). Patterns that have an even pattern length don't.*

    After juggling an odd length pattern ones, the first throw of the second time the pattern is thrown, the other hand will start.
    F.e.: 441will be thrown as this:

        4 right
                4left
        1 right
                4left
        4 right
                1 left

    Therefore every hand will have to throw every height of the pattern. That makes such patterns harder but more beautiful. To train them, it can help a lot if you make them even first by adding one throw on the basic height (height equal to the number of balls you juggle).

2) *Long patterns are difficult and normally not very beautiful, unless they have a certain visual structure.*

A nice long pattern with three balls is 3456012, because the audience sees 0123456, so they see balls flying higher and higher, all towards the same hand..

3) *If the length of a pattern is added to (distracted of) one of the heights, you get a new pattern juggled with one ball more (less)*
So 441 can become 741, 444 or 471.
This can be useful to find patterns that are similar to the one you want to learn, but easier.

4) *If you add 1 to every throw you get a new pattern that is juggled with one ball more.*
So 441 can become 552.

5) *If a ball is thrown up to a height equal to the length of the pattern, it will always be the same ball that is thrown to that height.*
This is useful thing to know. It can help to learn a trick or to understand a pattern you see.
On stage it can be nice to juggle such patterns with one ball of another color.
F.e.: 4413, 531, 52233, 534, 53444, 633, 6334, 7333444…
If there is one ball that always does the same two heights then the sum of those heights are equal to the length of the pattern
You can use this in spilt showers.
F.e.: 7131 The 13 stays cause 1 + 3 = 4 = length of the pattern
51517131 The 17 stays
915171 The 15 stays

Exercises: Some questions

Which patterns aren't possible to juggle?

914, 333423, 881, 801, 741, 432, 63, 5561551, 84418414814414

Answer: 914, 881, 432 and 63 aren't possible

Change them into valid patterns
F.e. 914 isn't possible, but 714 and 915 are . Mind that 924 and 951 aren't possible.

How much times higher is a 4 than a 3 ?
The same question for a 5 and a 4, a 6 and a 4, a 9 and a 5

Lesson 14: selecting patterns; beauty and difficulty

Beauty of patterns

If you search patterns yourself, it's important to know whether a pattern will be stupid or not before you start training it. That needs some feeling with patterns, but I can give you some general rules that will help.

1) Zero's

Patterns with zero's mostly look strange, not fluent, ugly (But ugly can be good). Zero's can be useful as learning patterns or to do pirouettes or so..

2) Two's

Unless you want to do something with a pause it's generally not so beautiful. However if you use the pauses to do something, these patterns get very interesting.

3) Long patterns

Long patterns (more than 5 throws) are only beautiful if there is some kind of structure detectable; if they have some kind of image. Otherwise the audience sees a soup of props.

Examples:

3456012	The balls fly higher and higher. The people see 0123456 0123456 …
7272712	Three balls arc on the same line, one ball is snapped.
97531	The balls cross and peak at the same moment, so what you see is a great rainbow
6461641	There are only three different heights. It's a game of low and high vertical throws.

For short patterns this isn't really a problem.

4) Odd or even patterns: Symmetric or not

An odd pattern, is a pattern with an odd number of throws. Odd patterns change hands and are therefore more beautiful. Even patterns don't change hands and are therefore easier. To make a (low state) pattern odd or even you just need to add a basic height throw.

Fe:
441 changes hands. It easier to learn 4413 (3 because it is a three ball pattern) which doesn't change hands.
5551 doesn't change hands. It's a great deal more appealing if you ad a 4 (four props). That gives 55514.

Difficulty of patterns

Once you have found a pattern that looks interesting, it is important to know how difficult it will be. There are some logic rules that can help you guess.

1) The more props the harder (As if you didn't knew)
2) The higher the throws, the harder
   Fe: 7333 is harder then 6334.
3) Odd patterns (odd length) are harder than even patterns
   Fe: 531 is harder than 5313
4) Long patterns are harder than short ones
   Fe: 84418414814414 is harder than 84413
5) High state patterns are harder than low state patterns (see more next chapter)
   Fe: 714 and 741 are harder than 7441
6) Height 2 makes things easier.
   Fe: 423 is easier than 441, 552 is easier than 534.
7) A combination of very high throws and 3's (or 4's) is hard
   Fe: 813, 633, 933, 834, 73, 73734, ...
8) Two consecutive high throws are always hard
   Fe: 663 is much harder then 744
9) A high even throw after a lower odd height causes collisions (unless you throw the even heights on the outside)
   Fe: **5678**01234, **56**1, **85**5, **65**4 ...

These rules can only help you guess, because every pattern has its own story. In lesson 19 : stabilization theory, there's a little more about difficulty of patterns.

Lesson 15: Synchronous patterns

If you have just read the theory about asynchronous patterns, stop reading and juggle some easy patterns to get used to Site Swap (part two; chapter 4). Otherwise, go on.

In synchronous patterns both the arms throw at the same time. It is not necessary that they do the same thing.
This makes that we can't throw to odd heights as the neither one of the hands is ready to catch on odd counts. And it means that an even height can be thrown to both hands, as both hands will be ready to catch.

How to throw these heights ?

A 4x or a 6x, is exactly the same as a 4 or 6, but now thrown to the other side.
A 2x is about the same as a 1. It is a snap into the other hand, only a little less fast. This may seem strange, but believe me, do it the same as a 1.
Except of this everything stays the same.

How to write a legal pattern ?

The synchronous throws are written between brackets. The right hand throw stands fist, the left hand comes next.. If a throw needs to go to the other hand, an X is added to the height.
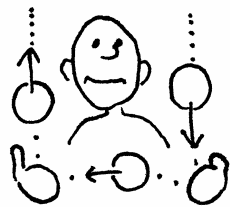
F.e.:   [42x][2x4] the three ball box (see left)

[6x4x] the five ball half shower (see right)
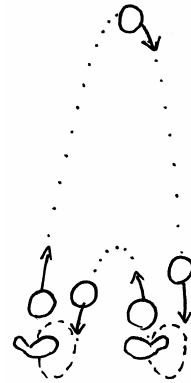
The basic rules stay the same:

1) The number of props is the average of the heights
2) Two props can't come down on the same moment, in the same hand.

The easiest way to verify the second rule is this:

Draw an arrow starting from each throw, to the count that the prop will come down.

F.e.   **[4 2x] [2x 4] [4 2x] [2x 4]**
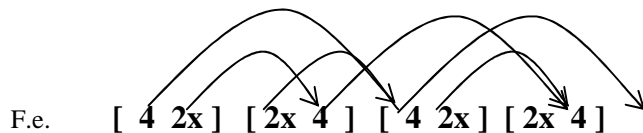
If the throw is crossed (followed by an x), let the arrow come down on the other
Count between brackets.

F.e.:   **[4 2x] [2x 4] [4 2x] [2x 4]**
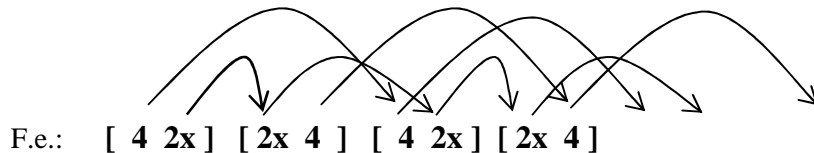
If there falls one arrow at every count, the pattern will be possible to juggle.

Extra notation mark

If the pattern changes hands when it is repeated, (as the box, written above), the notation is shortened by writing only half of the pattern, and adding an * to it. However , the asterix is mostly left out (because if it can change hands, jugglers almost always will do so).

Fe: [42x][2x4] becomes [42x]* mosty written as 42x.

Additional rule

To make patterns symmetric, you can't add a throw anymore. In some patterns you can continue the mirror image after every cycle, in other patterns you'll need to change the direction of some throws (this depends of the state of the pattern (see more later on).
Most four ball patterns can change, most three or five ball patterns need to be changed.

Some exercises:

Try to search yourself, how to juggle the next patterns:

[4x 2][0 2x]
[4 2] [0 4][2 0]
[4x 2x][4x 0][0 2x]*
[6 2][2x 2x] and [6 2][2x 2x]*
[4x4x][4x0]*
[6 4x][2x 0]*

Lesson 16: Creating patterns

It is possible to create new patterns by writing a string of numbers and checking rule 1 and 2, to see whether it is possible to juggle them.
This will take a lot of time. Therefore there are some better methods created. The easiest is explained here, another one using state tables is explained two lessons further, and is nice because you don't need to count anymore..
When you have a little experience with Site-swap juggling, you can search variations on patterns (and patterns) using the trick-creator explained below.

Asynchronous pattern generator

1) Start with any pattern (or combination of patterns) you want. You can add patterns (or just the number of props you juggle), behind or in front of the string.
2) You van switch the place of the heights, but you need to add the number of places a height moves forward and distract the number of places another height goes backwards.
3) You can repeat this.

Example:
I choose to start with the three ball cascade:
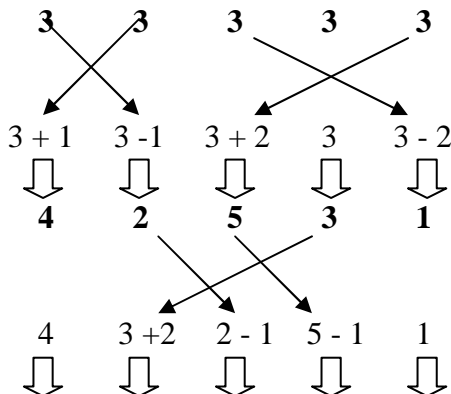
4   5   1   4   1

First I switch twice two heights and get the patterns 42531, then I move the 3 forwards, and thereby the 2 and 5 backwards and get 45141.

Try to make some patterns yourself. If do the moves correctly, every pattern you make be possible to juggle, and every pattern is possible to make.

Try these ones: 441, 64131, 4560123, 575151 and the difficult 51 or 741.
The last two or difficult because they are high state patterns. More about such patterns later.

Lesson 17: Trick-creator for new variations, styles, patterns…

The trick creator is no more than a theoretic help to make patterns out of ideas. It is a general principle to create new stuff applicable on everything. Making tricks, patterns, cooking,..)

The basic idea is this:

You have found something
         (A flashy finger trick, a groovy move, an idea in the back of your head,...), and you want to makes something more of it.
         (Let's say you want to use the finger trick in a 3 club pattern f.e.)
Then the following sequence will help you:

   1)   Translate what you have found to a theoretical base.
   2)   Put it in the general structure.
   3)   Search what possibilities are left for the other throws, and choose the most convenient one
   4)   Try to juggle it.

Example 1: A simple example: I can juggle the four ball fountain. That is two balls in each hand. I would like to throw a ball to the other hand. When I try it, everything comes down on the same moment, so I can't catch it. What do I need to do ?

   1)   Translate what you have found to a theoretical base
        If you want to cross a ball, you'll need to throw another ball back, otherwise you'll end up with three in one hand. And a crossed ball needs to be an odd height (see theory), so that means we want to do this: odd height odd height.
        However those odd throws may not come down on the same moment as the 4's thrown before it. That means that the first throw may not be less than a 4.

   2)   Put it in the general structure
        Juggling four balls is this: 444444....
        That gives: 4444odd height odd height444...

   3)   Search what possibilities are left for the other throws
        There are no other throws, we just need to find out which heights we can throw.
        Let's keep it easy, let's throw a 5 to the other hand, and see what comes out.
                That gives: 44445odd height444...
        The average needs to be 4, as we juggle 4 props. As all the others are 4, the average of the two crossed heights needs to be four, so that means that the other crossed ball needs to be 3.

46

That gives: 444534444...

This pattern is possible, and one day you'll find it easy, however when you first try it, the 3 will be way too high. Therefore first read the next example:

Example 2: I want to cross a ball while juggling four balls, without that hard height three as in the previous example

1) Translate what you have found to a theoretical base
   So to keep it easy we'll throw two 5's. As the average needs to be 4, we'll need to add some throws (after the 5's) to get it right.
   That gives: 44455...444

2) Put it in the general structure
   Let's say we want to correct everything in one throw.
   That gives: 444455?444...

3) Search what possibilities are left for the other throws
   The average of the three abnormal throws needs to be 4. That means that together they need to be 12 (3 x 4). We already have 10 (5 + 5), so we still need a 2.
   That gives: 44445524444...

   If you try this, it may not work the first time, but it sure is the easiest way to cross two balls, and I'm sure it will work after trying it a few times.

Example 3: You have found a trick with one prop, and you want to do it while juggling three props.

Let's say you're a club juggler and you've found this with one club:
If you do a flourish (see following chapter), just before you end it, when the club is vertical, you can grab it with your other hand and continue a flourish on the other side. And of course, as you like this, you have learned it using the double flourish too. So that means you can continue flourishing with one club as long as you want.
Good, that's what you've found, but now, how in hell are you going to do this while juggling three clubs ?

1) Translation to theory
   To do a flourish, you need one pause, or in other words, you need a 2. As the double flourish needs twice as much time, you'll need two consecutive pauses in one hand.
   Then we pass the club to the other hand. As it isn't a throw (it's really giving, there's now fly-time), it can't be a 2x, it has to be a 1.
   So what we do is this: 2 . 2 . 1

2) Put it in a general structure
   Normally, you have a large freedom of choice here, but in this example, it's quite obvious, as the 2 . 2 . 1 leaves little option; it will be an asynchronous five count pattern. (as because of the 1, five count because we already have Trhee throws 2, 2 and 1 and between those's we need 2 throws done with the other hand. It would however be possible in a seven count pattern too …)

3) Search what the other throws need to be
   As the average of the heights needs to be 3 (we juggle three props), the five throws together should be 15. As we already have: 2 +2 +1 = 5, we still need 10 heights, in two throws. That means 5 and 5, or 6 and 4 or 4and 6. As there may never drop two clubs on the same moment, we can only do the 5 and 5 (check it out yourself if you don't believe me). So finally we get:
   25251,

or as we normally write this pattern:
         52512.

2) 4)   Try to juggle it
The flourish can be done on a short pause, therefore high doubles as 5's should do.

Example 4: You want to do a three prop trick with four props.

Let's say you want to do the box with four balls. Here we go:

1)   Translation
3 ball box is [42x][2x4] (chapter 9)
So in other words, a box is a symmetric synchronous pattern, in which a vertical throw (V) is always combined with a horizontal one (so it creates a box-shape).
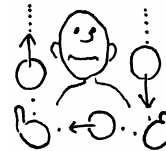
2)   Put it in a general structure
The structure we can choose:
[V2x][2xV], or [V2x][V2x][2xV][2xV] or still longer.

3)   Search the other throws
As we want something short that repeats (2-count or 4-count), we can first search with [V2x][2xV].
To result in an average of four, we need a 6, and it can't be crossed (6x), as we want a vertical throw. This gives us [62x][2x6]. However, both the first 6 and the third 2x drop on the same moment in the same hand:
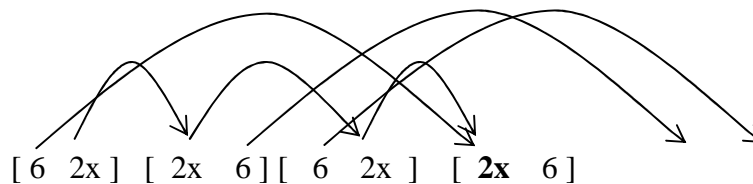
[6   2x] [2x   6] [6   2x] [**2x**   6]

Therefore, this isn't possible ([6x2x][2x6x] would be possible, but then the high throws cross).
However in [62x][62x][2x6][2x6], everything drops separately, and therefore, the four count pattern is possible. As a final result we get:
            [62x][62x][2x6][2x6]

4)   Try to juggle it
Don't keep staring at this paper, juggle it !!

Notes to this method

1)   The sequence of this can change a bit, but the ingredients stay.
You could juggle a pattern (let's say 441) and try a variation while doing it. (Let's say: throw the first 4 as a cartwheel (see next chapter)).
What you're actually doing is this:
         Choosing a general structure (441)
         Thinking what is possible on a 4
         Trying it.
It's the same, only the other way around. As long as everything stays simple you can do this.

2)   "You have found something" should be considered very largely. Every possible idea or question is enough. Just try to translate it.

Would this be possible with clubs ?, Could I do this trick in simples ?, Is this possible synchronous ?, What happens if I cross my arms ?, Which patterns are possible with a (5,4) multiplex ?...

3) Translation
    The translation isn't always fixed. Mostly you can choose.

    Snaps
    A slow snap can be a 2x. A fast snap has to be a 1 and not a 2x. If you really need to do a fast snap in a synchronous pattern, you'll need a [2x 0], then the 2x may come too fast in the other hand.
    So you can choose between 2x, 1 and 2x0.

    Fountain throws: .
    If a prop stays in the same hand, and it stays low, it's a high 2 or a low 4. It will depend a bit of the speed (height) of you're other throws. Generally, if you can catch and throw something while it's in the air in that hand, it will be a 4, if not, a 2.
    But be aware that in patterns with a 4 . 0 (a 4 followed by a 0 in the same hand as 6**42**0 or 4**44**0 f.e.), you don't have to catch while the 4 is in the air, so then you can do a really hard, or really fast 4. This is very important see patterns 6420 and 4440 !!!
    So you can choose between 2, 4 . 0 and 4.
    The story for 6 and 4 is completely similar.

    Cascade throws:
    3 or 4x, 4x or 5 ? Generally, it's up to you to choose. Will synchronous be more beautiful in this trick or not ? If you need pauses, then chose for the highest option,...

4) Translation 2
    Don't only translate your "throw". Some throws need some preparation time, and therefore need a pause before you can throw them.
    This makes a lot of 3 club-basic pattern variations a lot easier if you throw [4x2]*
    instead of 3. This discussed a bit deeper in the technical lesson 6: Binary and ternary juggling.

Lesson 18: State theory, state tables, high state patterns

What is high state?

State theory is a theory that reduces juggling even further than site swap did. At first it is hard to believe that such enormous reduction of what happens can still be useful. But once you understand the practical use of State tables, you'll see that it is useful.

If you don't like too much theory, skip this part, and go to the explanation of State tables at ones.

State theory

Actually there's only one rule to know if a pattern is possible to juggle or not:

Two balls may never come down on the same moment into the same hand

As we juggle AS-patterns, the hands never catch on the same moment. So on every count there can be one or no catch.

When you stop throwing the catching sequence could therefore be:

Fe: Catch Catch No-catch Catch

If 1 stands for a catch, and 0 for no catch, we get:

1 1 0 1

However states are always written from the right to the left. So the correct state is:

  1 0 1 1

It's logic that the number of ones stands for the number of props we juggle.

In older books (Four ball juggling, Martin Probert), the states are shortened by interpreting them as number written binary. I don't advise to do this as states as 23 (= 10111) are difficult to work with. To understand what that means you need to transfer 23 again to it's binary code (10111). It's just simpler to stick to the 10111. Second, new state tables have been developed since which describe multiplex and synchronous patterns. Then two balls can come down on the same moment so that the states can not longer be considered as binary numbers (there are 2's).

Therefore I will not make the transition.

State of a pattern

If you stop a pattern just after the last throw of the pattern, the sequence of catches then made determines the state of the pattern (this will be the lowest state that the pattern passes trough, except for multiplex patterns). For every low state pattern the sequence will only consist of catches.

  Fe: four balls give: 1 1 1 1.

In high state patterns the sequence consist zero's and ones.

  Fe: Four ball shower: 1 0 1 0 1 1 (I remind you; read from right to left).

The state changes while the pattern is juggled. The lowest state that the pattern passes trough is called the state of that pattern. A pattern always passes threw it's lowest state at the end of the pattern except multiplex patterns).

Fe: 534:

        If we stop after the 5 the catches are 10111 (read from right to left !)
        If we stop after the 3 the catches are 1111
        If we stop after the 4 the catches are 1111

So 534 is a state 1111 pattern.

As the number of catches is always the same as the number of props you juggle with, four props will always include four catches and therefore, the lowest possible state for a (non-multiplex) four-prop pattern is 1111 (15). Every pattern with a state 1111 is therefore called a low state pattern, the rest (four props) are high state patterns.

What can I do with that ?

1) Switching to another pattern

You can only switch between two patterns when they pass through the same state

Example 1: 633 to 534, two low state patterns

The states through which 633 passes is (for 534 see higher (10111, 1111, 1111)):
        If we stop after the 6 the catches are 100111 (state 39)
        If we stop after the first 3 the catches are 10111 (state 23)
        If we stop after the last 3 the catches are 1111 (state 15)

That means   we can't change after the 6,
                as 534 doesn't passes through the state 100111

                We can change after 63
                as 534 passes through the same state after throwing the 5.
                So after throwing 63 we can continue with 345

                We can change after 633 continuing with 534.

That last switch is the most natural, and is always possible between low state patterns (switching after you have finished the pattern).

Example 2: 534 to 741, two patterns of a different state

The states through which 741 passes are (for 534 see higher (10111, 1111, 1111)):
        If we stop after the 7 the catches are 1001011
        If we stop after the 4 the catches are 101101
        If we stop after the 1 the catches are 10111

That means we can only change after the 5 to 741 (cause then we have state 10111 in both patterns). And that we can't change after 534 what is a natural thing to try.

Example three: 534 to 71

Sometimes there are now equal states in the patterns, then linking throws are needed. Linking throws bring a pattern up to the wanted state. The linking throws are easily found with state tables or by using pattern generator one (see example, but state tables are much easier).

4444444444444444

534 534 444 53 53 53 53
534 534 444 5 62 62 62 3
534 534 444 56 71 71 23
534 534 **56** 71 71…23

Linking throws can always be improved by using state tables or pattern generator 1. To go from 444 to 7171 we can do 56 but also 74 (switch 5 and 6). The 74 can be easier cause it includes the same heights as the two linked patterns.
I will always give the linking throws between the basic pattern (low state) and the pattern that I discus. They are sometimes added between brackets before and after the pattern: (5)741(3) f.e.

2) Starting a high state pattern

When teaching lots of pupils ask me how you can know how much balls you need to hold in which hand to start a pattern. Although it's a simple question, I can't give a simple answer to them unless they have a notion of state theory.
I'l try to explain here very simple:

1) for every low state pattern (so for most patterns) you divide the balls equally over both hand, and if you juggle 3 , 5 or 7 balls, one more in the hand that starts.

    1)   for high state patterns this doesn't works ! Then one of the following options:
    a)   divide as for low state patterns and just start but change the 1's (or 0's) into 2's until it isn't needed anymore. This sometimes works, and is an easy solution.
    b)   Another easy solution: think were you will have a problem (mostly a one into a hand that still holds balls, and make sure that that hand will be empty wxhen throwing the 1 into it (for example to throw 741, the 1 will have to be thrown in a hand still holding the fourth ball if you start with two in each hand. So just make sure that hand is empty then. In other words, the hand that throws first holds three so that the other should only hold one.)
        As this doesn't always works:
    c)   Divide as for low state patterns and start with the needed transition throws. (see higher) For example to start 741, hold two balls in each hand and throw 5 741741741 …
    d)   If you don't want to start with those transition throws then you can sometimes solve the problems doing this: divide the balls as for low state patterns, and then change the place of the balls as they would have done while throwing the transition throws.
        As 741 needs a 5 as transition throw, one ball needs to change to the hand that will throw the 7.
        Sometimes however you will need to throw the first cycle(s) with extra pauses an d zero's until you get into the right state.
        714 for instance needs 55 as linking throws, which means both hands keep 2 balls. Then if you refuse to throw those liking throws, the start will give this strange cycle: 724 704 714 714 714 … (theoretical mark of no importance: if you want to track this down on a state table, then mark that the 2 is actually a (2,2) as you still hold two balls (or differently seen the second 7 is actually a (7,2)). Therefore instead of a 2 you need to chose the 4 and think (2,2).

3) State tables

Every practical use of the state theory is summarized in the state tables. Even better is the fact that you only need to draw lines to find everything you which.
(So you don't need to think !!!)

By using state tables you can find every possible pattern, and every pattern that you find is possible to juggle. There are state tables possible for every number of props, for multiplex, for synchronous juggling,...

How to use them

1)   Always start on the diagonal line. For low state patterns, start in the left under corner.
2)   Go up until you find a height that you which to juggle and change direction towards the diagonal line there.

3) At the diagonal line change direction again. If you which to throw height, go up if you which to throw low, go down.
4) Repeat 2) and 3) until your line closes. Every corner of your polygon is a height which you have to throw. Number on the diagonal (in the left under corner) can be thrown as much as you which (that can be zero times).
5) The numbers left of the table stand for the state trough which you pass.
6) If you haven't started in the left under corner, you can search a line from that corner to your starting point. That are the liking throws that are needed to go from low state patterns to your pattern.

Example 1:

Take the 3 prop state table
Go up until you reach the 5. Turn, at the diagonal, go down to the 3. Turn towards the diagonal, go down to the 1. Turn and go to the 3 in the corner. The polygon you have made has 6 corners, the numbers on those corners are 5, 3, 1 and 3. If don't want to throw the bottom 3, we end up in the pattern: 531

Example 2:

Take the 4 prop state table
Start on the diagonal, one place higher than the bottom 4 (state 1011). Go up until you reach the 5. Turn, at the diagonal, go up to the 6. Turn, at the diagonal, go down to the 1. Turn and close the line at the diagonal. This gives the pattern 561. It is hard to find high state patterns with pattern generator one. Therefore I rather use state tables.

On the following pages there are state tables for a lot of uses. You can make others yourself or enlarge these ones if you want. The method is this:
1) Write all the possible states in a logic order above each other on the left side, and add the diagonal line
2) Then use the empty state table. Choose a throw, think to what state that throw will bring you, and fill it in on that state. Move on.
It's a lot of work, but you only need to do it ones.

State tables

3 prop asynchronous state table
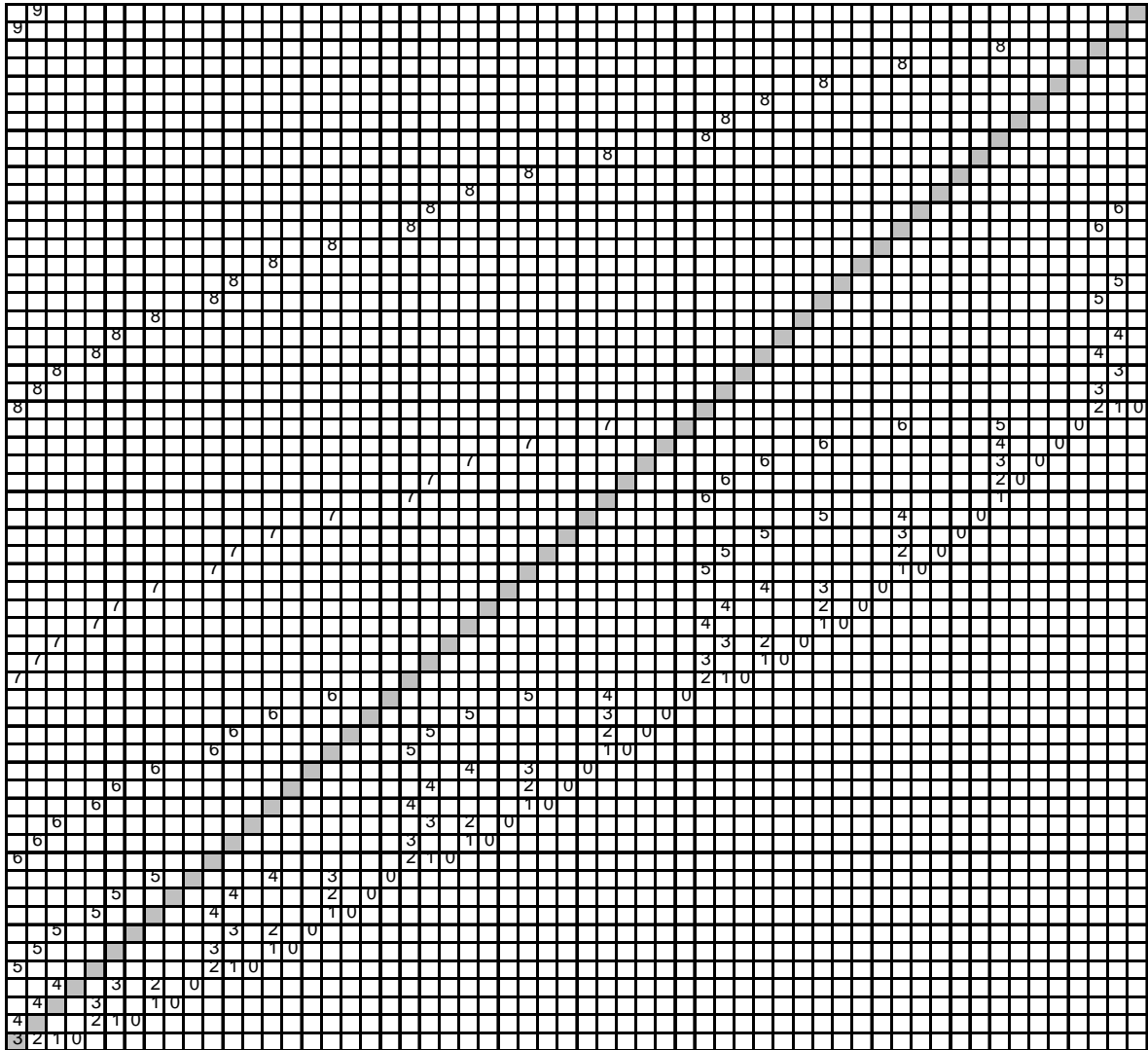
4 prop asynchronous state table

4 prop shortened as state table

As large state tables aren't easy to use, and as most of the very high states are stupid states (resulting in only stupid patterns, to include high throws, it's better to leave those states out of the table. In this table I've left out all the 0's, and consecutive 1's and 2's.

11						
11						
11						
11						
11						
11						
11						
10				6		
10				6		
10				5	3	
10				5	2	1
10				4	3	
10				4	2	1
10				3	2	1
9	*		6			
9	*		6			
9	*		5	3		
9	*		5	2	1	
9	*		4	3		
9	*		4	2	1	
9	*		3	2	1	
8	*		6			
8	*		6			
8	*		5	3		
8	*		5	2	1	
8	*		4	3		
8	*		4	2	1	
8	*		3	2	1	
7	*		6			
7	*		6			
7	*		5	3		
7	*		5	2	1	
7	*		4	3		
7	*		4	2	1	
7	*		3	2	1	
6	*		5	3		
6	*		5	2	1	
6	*		4	3		
6	*		4	2	1	
6	*		3	2	1	
5	*	4	3			
5	*	4	2	1		
5	*	3	2	1		
4	3	2	1			

5 prop as state table

5 prop reduced state table

Again no 0's, nor double 1's, nor triple 2's

3 props asynchronous multiplex state table

100002	611	61	6		59				55
30000	555								55
21000	554					55			54
20100	553			55					53
20010	552		55						52
20001	551	55							51
12000	544					54		5	44
11100	543			54		53		5	43
11010	542		54			52	5		42
11001	541	54				51	5		41
10200	533			53	5				33
10110	532		53	52	5				32
10101	531	53		51	5				31
10020	522		52	5					22
10011	521	52	51	5					21
10002	511	51	5						11
3000	444				44		4	0	
2100	443			44	43	4	3	0	
2010	442		44	42	4	2	0		
2001	441	44	41	4		1	0		
1200	433			43	4	33	3	0	
1110	432		43	42	4	32	3	2	0
1102	431	43	41	4	31	3	1	0	
1020	422		42	4	22	2	0		
1022	421	42	41	4	21	2	1	0	
1002	411	41	4	11	1	0			
300	333			33	3	0			
210	332		33	32	3	2	0		
201	331	33	31	3	1	0			
120	322		32	3	22	2	0		
111	321	32	31	3	21	2	1	0	
102	311	31	3	11	1	0			
30	222		22	2	0				
21	221	22	21	2	1	0			
12	211	21	2	11	1	0			
3	111	11	1	0					

4 prop doable duplex state table

1000012	72	71	7																				6				
111100							65						64				62		6				6				
111010					65						64					62		6									
111001				65						64					61	6									54		
110110			65				63				62		6														
110101		65				63				61	6														53		
110020								62																			
110011	65						62		61	6															52		
110002	65						61	6																	51		
101110			64			63		62			6																
101101		64			63		61	6																	43		
101020					62																						
101011	64			62		61	6																		42		
101002	64			61	6																				41		
100120			62																								
100111	63		62	61	6																				32		
100102	63		61	6																					31		
100021	62																								22		
100012	62	61	6																						21		
11110			54		53		52		5		43		42		4	32		3		2		0					
11101				53		51	5		43		41	4		31	3		1	0									
11020					52					42				22		2											
11011				52	51	5		42	41	4		21	2		1	0											
11002				51	5		41	4			11	1	0														
10120			52					32		22		2															
10111	53		52	51	5		32	31	3	21	2		1	0													
10102	53		51	5		31	3		2	11	1	0															
10021	52					22	21																				
10012	52	51	5		21	2	11		0																		
1120			42		32		22																				
1111	43		42	41	4	32	31	3	21	2	1	0															
1102	43		41	4		3			11	0																	
1021	42				22		2																				
1012	42	41	4		21	2	11	0																			
121			21	2																							
112	32		3	21	2	11	0																				
22	22	21	2																								

5 prop doable duplex state table

State	Values (left→right)
1010021	75 … 72
1010012	75 … 72 71 7
1001120	72
1001111	73 … 72 … 71 7
1001102	74 … 73 … 71 7
1001021	74 … 72
1001012	74 … 72 71 7
1000121	72
1000112	73 72 71 7
1000022	72
111110	65 … 64 … 63 62 … 6 … 54
111101	65 … 64 … 63 … 61 6 … 54 … 53
111020	62
111011	65 … 64 … 62 61 6 … 54 … 53 … 52
111002	65 … 64 … 61 6 … 54 … 53 … 51 5
110120	62 … 52
110111	63 62 61 6 … 53 52 51 5
110102	65 … 63 … 61 6 … 53 … 51 5
110021	65 … 62 … 52
110012	65 … 62 61 6 … 52 51 5
101120	62 … 42
101111	64 … 63 62 61 6 … 43 42 41 4 32
101102	64 … 63 … 61 6 … 43 … 41 4 … 31 3
101021	62 … 42 … 22
101012	64 … 62 61 6 … 42 41 4 … 21 2
100121	62 … 32 22 21 2
100112	63 62 61 6 … 32 31 3 21 2 11 1 0
100022	62 … 22 21 2
11120	42 … 22
11111	53 … 5 … 43 42 41 4 32 31 3 21 2 1 0
11102	54 53 … 43 … 41 4 … 31 3 … 11 … 0
11021	54 … 52 … 42 … 22 21
11012	54 … 52 51 5 … 42 41 … 21 2 11 … 0
10121	52 … 32 22 21 2
10112	53 52 51 5 … 32 31 3 21 2 11 1 0
10022	52 … 22 21 2
1121	42 … 32 … 22 … 21 2
1112	43 42 41 4 32 31 3 21 2 11 1 0
1022	42 … 22 21 2
122	32 22 21 2

3 prop synchronous state table

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
8 2x / 2 8x	8 2 / 2x8x	0 8x	8 0																		
8x2x / 2 8	8x2 / 2x8	0 8	8x0																		
					6 6 / 6x6x																
				6 6 / 6x6x																	
	6 6 / 6x6x																				
6 6 / 6x6x																					
				6 4x / 4 6x	6 4 / 4x6x																4 4 / 4x4x
				6x4x / 4 6	6x4 / 4x6																4 4 / 4x4x
	6 4x / 6x4				6 2x / 2 6x							0 6x	6 0								4 2x / 2 4x
6 4x / 6x4					6 2 / 2x6x					0 6x	6 0										4 2 / 2x4x
	6 4 / 4x6x			6 2x / 2 6x				0 6x	6 0												4x2x / 2 4
6 4 / 4x6x				6 2 / 2x6x		0 6x	6 0														4x2 / 2 4x
	6x4x / 4 6				6x2x / 6 2							0 6	6x0							4 2x / 2 4x	
6x4x / 4 6					6x2 / 2x6					0 6	6x0									4 2 / 2x4x	
	6x4 / 4x6			6x2x / 2 6				0 6	6x0											4x2x / 2 4	
6x4 / 4x6				6x2 / 2x6		0 6	6x0													4x2 / 2 4x	
6 2x / 2 6x	6 2 / 2x6x	0 6x	6 0																		2 2 / 2x2x
6x2x / 2 6	6x2 / 2x6	0 6	6x0																		2 2 / 2x2x
	4 4 / 4x4x			4 2x / 2 4x	4x2x / 2 4			0 4x	4 0					0 4	4x0	0 2x	2 0	0 0	0 0		
4 4 / 4x4x				4 2 / 2x4x	4x2 / 2x4	0 4x	4 0						0 4	4x0		0 2	2x0	0 0	0 0		
4 2x / 2 4x	4 2 / 2x1x	0 4x	4 0	2 2 / 2x2x								0 2x	2 0	0 2	2x0	0 0	0 0				
4x2x / 2 4	4x2 / 2x4	0 4	4x0	2 2 / 2x2x		0 2x	2 0	0 2	2x0				0 0	0 0							

62

4 prop synchronous state table

10 6x / 6 10x							10 2x / 2 10x	10 2 / 2x10x											
10 6 / 6x10x					10 2x / 2 10x	10 2 / 2x10x													
10x6x / 6 10							10x2 / 2 10	10x2 / 2x10											
10x6 / 6x10					10x2 / 2 10	10x2 / 2x10													
10 4x / 4 10x			10 2x / 2 10x	10 2 / 2x10x															
10 4 / 4x10x	10 2x / 2 10x	10 2 / 2x10x																	
10x4x / 4 10			10x2 / 2 10	10x2 / 2x10															
10x4 / 4x10	10x2 / 2 10	10x2 / 2x10																	
8 8 / 8x8x														8 2x / 2 8x	8 2 / 2x8x	2 8 / 8x2x	8x2 / 2x8		
8 6x / 6 8x							8 2x / 2 8x	8 2 / 2x8x											
8 6 / 6x8x					8 2x / 2 8x	8 2 / 2x8x													
8x6x / 6 8							8x2x / 2 8	8x2 / 2x8											
8x6 / 6x8					8x2x / 2 8	8x2 / 2x8													
8 4x / 4 8x			8 2x / 2 8x	8 2 / 2x8x										4 2x / 2 4x	4 2 / 2x4x				2 2 / 2x2x
8 4 / 4x8x	8 2x / 2 8x	8 2 / 2x8x												4x2x / 2 4	4x2 / 2x4			2 2 / 2x2x	
8x4x / 4 8			8x2x / 2 8	8x2 / 2x8										4 2x / 2 4x	4 2 / 2x4x		2 2 / 2x2x		
8x4 / 4x8	8x2x / 2 8	8x2 / 2x8												4x2x / 2 4	4x2 / 2x4	2 2 / 2x2x			
6 6 / 6 6					6 2x / 2 6x	6 2 / 2x6x	6x2x / 2 6	6x2 / 2x6				2 2 / 2x2							
6 4x / 6x4			2 6x / 6 2x	2x6x / 6 2			2 4x / 4 2x	4 2 / 2x4x			2 2 / 2x2								
6 4 / 4x6	2 6x / 6 2x	6 2 / 2x6x					2 4 / 4x2x	4x2 / 2x4		2 2 / 2x2									
6x4x / 4 6			2 6 / 6x2x	6x2 / 2x6			2 4x / 4 2x	4 2 / 2x4x	2 2 / 2x2										
6x4 / 4x6	6x2x / 2 6	2x6 / 6x2					2 4 / 4x2x	4x2 / 2x4	2 2 / 2x2										
4 4 / 4x4x	2 4x / 4 2x	4 2 / 2x4x	2 4 / 4x2x	4x2 / 2x4	2 2 / 2x2x														

5 prop synchronous state table

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
L202						8x§ 6 8x	8 6 6x8x															
R202						8x6x 6 8	8x6 6x8															
LL2L			8 6x 6 8x									8 4x 4 8x	8 4 4x8									
LL2R			8 6x 6 8x									8 4x 4 8x	8 4 4x8x									
LR2L			8 6 6x8x					8 4x 4 8x		8 4 4x8x												
LR2R			8 6 6x8x				8 4x 4 8x		8 4 4x8x													
RL2L			8x6x 6 8									8x4x 4 8	8x4 4x8									
RL2R			8x6x 6 8									8x4x 4 8	8x4 4x8									
RR2L			8x6 6x8					8x4x 4 8		8x4 4x8												
RR2R			8x6 6x8				8x4x 4 8	8x4 4x8														
LLL2		8 6x 6 8x				8 4x 4 8x						8 2 2x8x	8 2x 2 8x						0 8x	8 0		
LLR2	8 6x 6 8x					8 4x 4 8x						8 2x 2 8x	8 2 2x8x					0 8x	8 0			
LRL2			8 6 6x8x			8 4 4x8x			8 2 2x8x	8 2x 2 8x							0 8x	8 0				
LRR2	8 6 6x8x					8 4 4x8x		8 2x 2 8x	8 2 2x8x							0 8x	8 0					
RLL2		8x6x 6 8				8x4x 4 8						8x2 2x8	8x2x 2 8						0 8	8x0		
RLR2	8x6x 6 8					8x4x 4 8						8x2x 2 8	8x2 2x8					0 8	8x0			
RRL2		8x6 6x8				8x4 4x8			8x2 2x8	8x2x 2 8							0 8	8x0				
RRR2	8x6 6x8					8x4 4x8		8x2x 2 8	8x2 2x8							0 8	8x0					
L022	8x4 4x8	8 4 4x8x	8 2x 2 8x	8 2 2x8x	0 8x	8 0																
R022	8x4x 4 8	4 8x 8 4x	8x2x 2 8	8x 2 2x8	0 8	8x0																
22L			6 6 6x6x					6 4x 4 6x		6 4 4x6x		6x4x 4 6		6x4 4x6								
22R			6 6 6x6x					6 4x 4 6x		6 4 4x6x		6x4x 4 6		4x6 6x4								
2L2		6 6 6x6x				6 4x 4 6x	6x4x 4 6		6 2x 2 6x	6 2 2x6x		6x2x 2 6	6x2 2x6			0 6		0 6		6x 0		
2R2	6 6 6x6x					6 4 4x6x	6x4 4x6		6 2x 2 6x	6 2 2x6x		6x2 2x6	6x2 2 6		0 6x		6 0		6 0		6x0	
L22	6x4 4x6	6 4 4x6x	6 2x 2 6x	6 2 2x6x	0 6x	6 0	4 4 4x4x					4 2x 2 4x	4 2 2x4x	4x2x 2 4	4x2 2x4			4 0 0 4x		4 0 0 4	4x0	2 2 2x2x
R22	6x4x 4 6	4 6x 6 4x	6x2x 2 6	6x2 2x6	0 6	6x0	4 4 4x4x		4 2x 2 4x	4 2 2x4x	4x2x 2 4	4x2 2x4			0 4x		4 0 0 4		4x0			2 2 2x2x

Lesson 19: Stabilization theory

The stabilization theory can be very helpful to juggle hard Site swaps. It states that it isn't necessary to throw the exact right heights, but the right mistakes. **This makes juggling many patterns a lot easier**. The theory itself isn't easy if you don't master asynchronous and synchronous site swap theory.

If you are a quite experienced pattern juggler you must have felt that some patterns are a lot more secure than others. Such patterns always keep working, no matter what you throw. The 534 fe is, once you master him, very stable. If you throw the 5 high enough, you can throw the rest as you want. 633 in contrary is a lot less stable. Why, and couldn't we make it more stable ?

The stabilization theory explains and forecasts stability, and it uses this to make difficult patterns easier. The central idea is: Which throw-mistakes will mess up everything and which ones won't change much. If we know that, juggling a pattern isn't walking on a rope anymore, but, on the edge of a canyon. Only mistakes on one side are disastrous.

The theory says that a bad throw (too high or too low) results in a disturbance of the rhythm. If we exaggerate the mistake and make it a full height higher or lower, one hand gets a full count too late, and we end up in a synchronous pattern. If that synchronous pattern is possible to juggle (no drops on the same moment into the same hand.), then everything between the correct asynchronous one and the exaggerated synchronous one will result in a juggleble pattern (with a strange rhythm). So in other words, not every mistake has to be disastrous.

Rules:
If a height is thrown too low, it will always cause problems unless you speed up the pace. In that case you could say that the low throw is correct and that the others are too high. I will always do so as it makes things simpler.

To find out which heights may be thrown too high, and which ones not we have to search for synchronous patterns that are similar to the one we want to stable.

An example:

534

To make it synchronous we need to make it four count. Therefore we need to add a 2 or 0 somewhere. Further, we need to make all the odd heights even. So we change 5 into 6x and 3 into 4x. If we do so we find two patterns: 534 becomes [6x4x][4 2]*
                                                      453 becomes [4 6x][4x 2]*
If we check both patterns we find that both are possible to juggle (no drops in on the same moment into the same hand.)
If you throw the 5 too high you will end up in [6x4x][4 2]*,
If you throw the 4 too low, or the 3 too high you will end up in [4 6x][4x 2]*.
So in other words, too make the 534 easier, throw a high 5 (6x), and throw the others as you want.

633

Do the same, you'll find:
[64x][4x2] and
[4x4x][26]
The second pattern isn't possible to juggle as the 6 drops together with the second 4x. The only way to secure the 633 is by throwing the first 3 directly after the 6, so almost synchronusly (as in [64x][4x2]). However, this is unnatural. The mistake normally made in 633 is that the first 3 is thrown too high, which makes it drop on the same moment as the second 3. Thereby you get into the [4x4x][62] pattern, which isn't possible.

So if you know that you may never throw the first 3 too high, but that throwing the second 3 too high isn't a big problem (you get into [64x][4x2]), 633 gets a lot easier. 6,low3,high3. Further , throw in a the following rhythm: 6 3   3 6 3   3   6 3   3.

This proves what I already knew, that 534 is much more stable than 633, but it also helps me to throw a more stable 633. You can do this yourself for other patterns, I will only give you the results (what to throw low, and what to throw high). Sometimes I'll add the stabilization patterns (SP).

Generalised

The most interesting ASS patterns have an odd length (I like three count most). That means we always have to add a pause to make them S. If you add a pause, you have to make the other heights larger (so that the mean stays correct). So to apply the theory you need:

Number of props	Odd heights needed	Examples	Stabilisation Pattern
3	1	423, 441	[42][4x2]*,[24][42x]*
4	2	741, 714	[28x][42x]*,[8x2x][4 2]*
5	3	753, 771	[8x6x][4x2]*,[28x][8x2x]*

In this table I have only quoted patterns of length 3 as I like them most, but length five is also possible.

However if we go up to six ball patterns (756, 855) we can't find enough odd heights anymore, as there are only three throws and we need four odd heights. With 5 balls the theory is very helpful to learn 753 and 771, but there aren't many patterns with three odd heights left.
Don't panic. With five or six balls you just need to add 2 to the even heights and the theory still works. So for 756, throw something between 756 and [6x 8][2 8x]. However don't throw [8x 6x][8 2], cause then the 6x and the previous 8 drop in the same hand.

Lesson 20: Beyond site swap

What's that ?

It's nothing to worry about if you are a club or three ball juggler. Then it's a big fuss about nothing, and it won't help you much. But if you like complicated stuff with a lot of balls, please go on.
Beyond site swap is a general term for every pattern screwing the first (and only) site swap "axiom". More specific:

> **they aren't thrown in a constant pace,**

which makes heights very relative.

Then, two major things can happen (actually, a lot more, but I'll keep short). You can change the pace but keep the straight rhythm, or go into a strange rhythm.
The first is still possible to express in site swap just by indicating where and how much the pace should change. Or more practical how much the real height of the throws changes.
The second possibility still gets a lot harder.
As it gets too complicated to understand what I mean just by reading even more expanded Site swaps (with rhythm indications), I won't go too far into it. I'll try to explain it in some examples.

Fast-slow pattern combinations:

Example 1: Shower-mess combinations

If you juggle the three ball Mill's mess, throw the a-throw as a 4x, the b as a 5x, and continue the shower (51).
This is a nice transition, but it gets even better if you increase the pace a lot by throwing the 4 and the 5 both on the height of the 3's in the Mill's mess. That's what I mean, the pace goes up and changes the image of the pattern a lot.
You can use Mill's mess but windmill looks very nice too.
To go out of a shower, into a mess, you can start whenever you want. Stop snapping. As the throwing hand doesn't receives a ball it should cross over (or under) the other arm to catch the incoming ball normally caught with the snapping hand. On that moment you're in the a (or c) position of the mess.
To go from a mess into a shower, throw the mess high and slow, and make sure that the first real shower throw is made on a b-throw. But that is actually very natural and trivial. (see also example above)
Both going in and out are, if you ask me very beautiful and not very hard to do. They can be your first Mills mess variations. Especially with four balls.

Some harder links that I like are:
Windmill into shower
531a MM into 7131 shower
55514 in and out the 71 shower
56414 to 9151 shower

Example 2: Multiplex into non-multiplex
Here again, you can keep the height of certain throws equal, although there site swap height is different. If you switch a slow multiplex pattern into a fast non-multiplex pattern that looks about the same, it is as if the multiplex vanishes in thin air.

> (7,5)121 into 9151

The (5,3)(1,1) is a multiplex four ball shower that is actually a double two ball shower. If you do the same, but snapping the first ball before the second is caught, you end up in (7,5)121. If you take this pattern gradually up it will get slow again. Then instead of the pause, throw a low nine, a split heigher than the multiplex 7. Continue a fast 9151.

> (6,4) 6121 into Boston Barrage four balls

In this variation the rhythm goes down instead of up. However in the transition itself there are some really fast throws.
Throw the (6,4) 6121 really low. You'll see that it's possible the do it very low. The (6,4) can be thrown lower than the 6.
Then instead of the pause throw a 4 on the outside, on the height of the 6's (this is that fast throw). Catch the second snap and do the same in the centre of the pattern. Catch the last thrown 6 with your opposite hand (so it will have to cross). The 6 becomes a straight up 5 like that. Continue the four ball Boston Barrage.

> (4,3)5521b Mill's mess into 56414c Mill's mess

If you haven't understood the patterns above, don't bother reading any further. I hope one day someone will understand this. If you are that person, you'll agree that understanding is the hard part, juggling it is really not that hard.
I'll explain the (4,3)5521 MM b first. It's easiest to start by holding two balls in each hand and throwing a straight up 3. Then the pattern can start. With the other hand throw a reverse (4,3) (b throw). Continue with a low 5c straight up and a high 5a crossed. The 4 is caught crossed and snapped into the hand that has just caught the 3. The 5c is caught normally, and there is a little pause after it because the 5a was thrown a lot higher. As the 5a drops the pattern can be repeated on the other side. To do so, don't catch the high 5 with the wrong hand as it were a 6. Throw a (4,3) with the other hand and cross your arms to catch it. Now continue.
However it is possible to catch the 5 as a 6 too. The (4,3)5621 transition will bring you into a (5,4)145621 variation in witch the 5 is thrown c and the 6 is thrown a. The (5,4) is also thrown

reverse and can therefore be thrown just the same as the (4,3). This drives up the rhythm a first time.
Then instead of the 2, throw a 4, you'll end up in the 56414 MM c and the multiplex will disappear.

Variations on this one are:
I like to throw the 56414 MM c with a high 6 and a very low 5. This gives a strange rhythm and a nice look to the pattern.
You could ad a second beyond site swap transition by going into (4,3)5521 out of a reverse (5,4)21. Throw the (5,4)21 very low. Then after throwing a (5,4), cross your arms, throw two high 5's and catch the (5,4) with crossed arms as it was a (4,3). Continue the (4,3)5521.

Rhythm doubling

Whenever you are juggling an AS-pattern you can change it virtually in an S-pattern on double speed. Then whenever you make a throw, the other hand gets an imaginary pause.
This however becomes reality if you juggle really high and slow. On every throw, the other hand gets a short pause which can be used to do something.
Toby Walker f.i. throws five clubs in two and a half spin (which is very slow for him), doing a half flic on every little pause.
Practically; if you juggle the three ball cascade high, you can double the pace at once. Then you end up in the S [4x2]* pattern, but you actually keep throwing the same pattern, only now you can start using those pauses to do tricks in the pattern. This of course you already knew.

The interesting part is that you then can not only throw [4x2]* variations, but every S-pattern of the same state as the [4x2]*. That means, that if you juggle a slow three ball cascade, you can switch into the box ([42x]*) whenever you want. Again, I guess you already knew that. And I admit, if you want to find beyond site swaps with three balls, don't think in site swap, just mix, twist and try while juggling.
For four or five ball juggling, and especially rebound it's quite different. But I gave the 4x2 example to stay simple. But the whole same is possible with the four ball cascade. You can switch into [6x2x]* box whenever you want if you're only juggling the 4's high enough.
As it is very common to juggle slow patterns and very fast patterns in rebound juggling, this opens a lot of possibilities for it. *Vincent Bruel, s*witches from a passive five into an 82x.

Between S and AS, another use of stability theory
stability theory provides us of everything we need to find intermediates between S and ASS patterns.

Example 1: The 633 machine
If you juggle the 633 a bit as the 64x 4x2, you get a pause, which is enough to make a machine out of the 633. (The 633 machine is explained in part Two: styles: Machines)

Example 2: Pure fountain patterns
In pure fountain patterns, there are no balls crossing. In such patterns, like the basic four prop pattern, it's a common knowledge that if one hand throws higher than the other, you switch in or out of the perfectly AS-rhythm. You can use this knowledge to switch from an AS to a S pattern, but it normally is very ugly. Use a straight up 5 as explained earlier.
However with some patterns it can be beautiful to switch the rhythm slowly. This example may bring you on ideas.

642
Juggle 642. Throw the 6's throw by throw lower. The pause will get shorter, the rhythm gets strange. The 4 is thrown closer and closer after the 6 until they are thrown to the same height, on the same moment.
The opposite is also possible; throw the 6's higher and higher. Keep the 4's low and throw them as late as possible. A short pause arises before the 4. Eventually you end up in the S pattern [4 2][8 2]*. From there, you can go into [8 2][4 2]; the double headed three in one hand, by throwing one 8x. Keep throwing in columns if you juggle this one.
Another transition goes into [8 2x][4 2x], the double headed box.

That's about all I'll tell you about beyond site swap. Try to search further yourself what is possible with rhythms.

Chapter1: **Possibilities**

with balls and clubs

Intro

The more possibilities you have, the more possibilities you are able to use, and therefore, the better possibilities you can chose. I've classified the possibilities to handle props in the following categories : blocks, balances, rolls and glides, "fingertricks", arm movements and swings, throws, catches, bounces and floor rolls and finally pick-ups.

Most good juggling tricks are nothing more than a special throw or catch, sometimes used in a simple pattern, sometimes not in pattern at all. To all of those tricks, there isn't much useful comment possible. In the following chapter I mention, explain or give advise to some classical possibilities to handle balls and clubs, nothing more.
It's not much more than a start. Try to search further. Search for other possibilities. Try to combine movement of your body with the manipulations. Search different ways to get into certain positions. Which throws fit with which catches and which moves go along with that ?

Although it's important to get your one-prop manipulations into more prop routines, keep an open spirit while working with one prop. First search nice tricks, and only then think about more props.
Making a trick out of a throw- or catchvariation or so, is usually quite trivial. Sometimes it isn't, then you can still do the trick while blocking the other props. And if you really wanna do it without blocking, then read the trick-creator in part I: knowledge.

Blocks

You can work with props by holding them between two limbs or other props. Although this is trivial, it is important to work with. As the best idea is mostly the easiest one, always consider the possibility to block one or more props somewhere.

Mark that every spot were you can block a prop, is a spot where you can catch it, and that many catches lead to interesting blocks. Don't strive to get out of that block as fast as possible, but search what can be done when you have a prop into that block. You may be able to do stuff with the other props, are you may be able to manipulate the prop out of the spot where it's blocked.

Blocks between limbs

A pattern: The gorilla

This is a very classic, very simple and very stupid pattern. However, it is an interesting pattern because you can search hundreds of variations on the theme. Use more props, other blocks, other props, other sequences, other transitions, get fingertricks or contact tricks into it, get throws and catches in it,…

Learning it:
Take three balls. Put a ball in both armpits and stretch both arms. Let a ball drop out of the armpit above the empty hand, and catch it in that hand. While doing so put the third ball in the armpit with the other arm. Now, the same can be done on the other side.

Blocks between   props
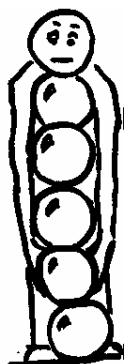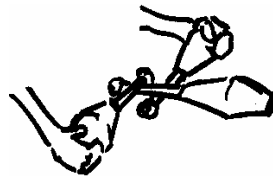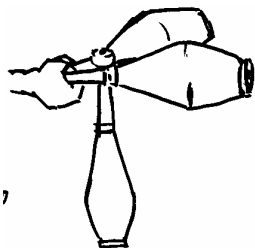
Compositions with props

By holding some props into a certain composition, nice images can arise. Lines, waves, triangles, animals or whatever. You can see much

funny images in street shows. The pirate or the rabbit to name just two. However it doesn't needs to be that stupid. You can make really interesting, lovely or abstract images. Look for instance at what many excellent french jugglers do as Gives; Thomas et Sylvain of "Les passes on rond"; or Denis Paumier.

Some funny club or ball images: (pirate, bunny, blind by balls, five club puppet, holding a baby …

An abstract three club holding-pattern

Thi is wrongly illustrated and explained. I'll need to do it again.

Hold the 3 clubs as illustrated left and turn everything. Let the righthand club drop, and catch it right handed under the other arm, at the top of the club.
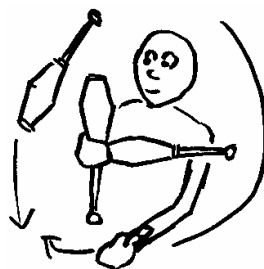
If right hand now puts the top the club, against the centre of the horizontal club, you get the mirror image of the starting position, and so, you can start again on the other side.

Balances

Ball balance

To keep a ball in balance, you need a flat (or a little hollow) surface. You keep the balance by keeping that surface flat or counter-act the movement of the prop. To do so on difficult places (as on your head or so), take a heavy ball and try to feel how it lays. Always take exactly the same spot, and concentrate on it. Feel the spot. Feel how the ball lays on it. Does it pushes a bit more on one side of the spot. If so, turn the surface a bit to counter act it.
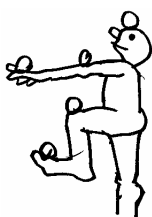
Ones you can keep the ball in balance try to improve your balance, so that you can balance while juggling or catch the ball on the balancing spot. To do so, move, run around. To make a catch, train on putting the ball very fast on the spot. From laying very fast to catching there's not such a big step anymore. Just go for it. To do other things while balancing, try to be aware of everything that happens. Don't focus on one of the things, but on all of them.

Laying balls on the forehead (three balls)

Learn to lay a ball very fluent when you aren't juggling (it doesn't need to stay on more than just a moment). While juggling a high cascade, catch a ball higher than normal and don't go down with the hand after catching. Instead

move directly towards your head and lay the ball on the forehead. If you try this trick while juggling, you should be ably to lay a ball on your head blindly. When you are moving up with the hand, try to watch the next throw so that you can catch it while concentrating on balancing.

Keep it balanced for a moment and then let it roll off towards the other hand. If it rolls of immediately, it's still possible to catch, but it looks a lot more fluent it stays on the head for a moment.

Variations

You could do this pattern four, three or two count but it can be better to train the balance, so that you can use the pause it creates instead of doing the trick continuous. Also possible is letting the ball roll off behind your back, doing a headroll, catch it under the armpit and stay juggling under the armpit,...

Laying balls on the temples

Learning this trick is very similar to the previous trick. First learn it with one ball, however now learn both right hand to temple and left hand to temple. Get used to the temple balance. Everyone has a hollow spot somewhere. Again when trying it with 3, look at the next throw when laying the ball. As soon as the ball is on your head, concentrate on balancing it, and make the catch of the next throw almost blindly (clawcatch). You can only do this if have paid attention to it when you were going up with the other.

To continue, go up with the other hand, flip your head, so that ball 1 rolls off in hand 1, throw the remaining ball out of hand 1 to catch it in other hand.

Variations

This trick is better to do continuous than the previous one.

If you can do the temple-to-temple-roll, you can continue on the same side

If you can lay the ball on the opposite temple. Then again you can continue on the
same side.

Ball-fork patterns

They are explained when explaining the ball-fork-catch a bit further in this
chapter.

Spinning ball balance

I don't know anything about this. If you juggle big balls, then try it. To spin two balls on each other, make sure that the top-ball is lighter and that it is half up to 2/3 as big as the spinning ball it spins on.

Vertical club balance

Learn difficult balances with long sticks, as they move slower, and are therefore easier.

Always look at the top of the club and react according to that.

Always try to correct as soon as possible, even before you know which side you need to move to. Just move.

Train on putting a club very fast in position. After releasing it, correct the angle. Further train on throwing a club from one balance to another, or throw it with spin and catch it directly into a balance. *Rafael de Carlos*, a Cuban juggler throws a very fast triple and catches the club on the top of his foot, to keep it in balance there.

Some nice balances and   constructions:
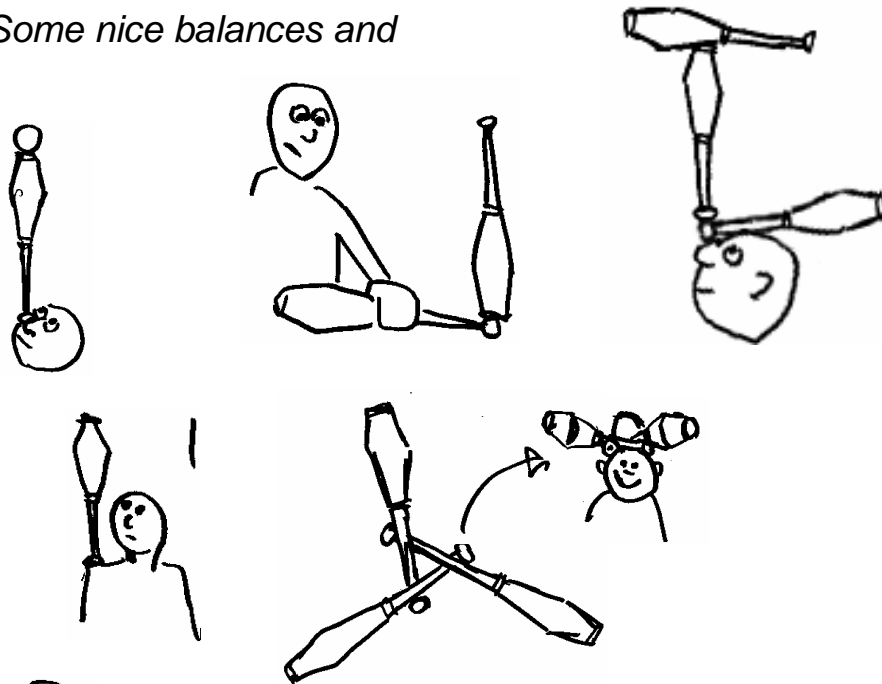
Club flip with the head
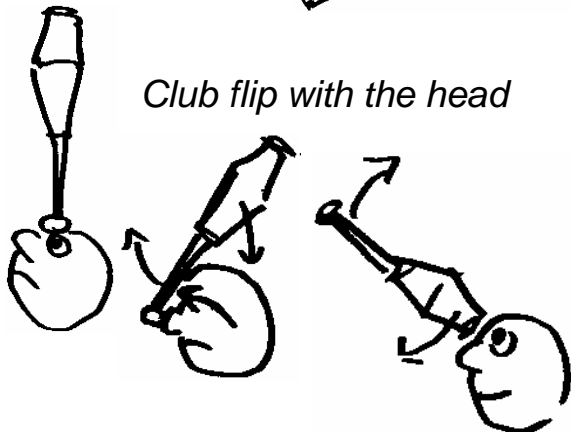
This is a nice and spectacular trick. Balance a club on the forehead, let it glide of your forehead, and when the handle glides on your forehead, give it a "kick" up with your head. If you do it right the club will make a simple spin when it drops.

Dirk Boxelaere *of the famous street-circus duo To be two*, flips the club high and really precisely, so that it comes again into balance on his forehead, but then on the other side of the club.

Easy line pattern

Hold the clubs as illustrated, move the line up, let loose the upper club, try to balance it while moving up the line. When it drops catch it low, in the free hand, put the club under the others and continue moving up the line, do the same with the other hand.

Sander De Cuyper, from the Cirqu'lation locale juggling Cie, does the hard variation of this one perfectly. He only holds one club in one hand. So when the upper club drops of, he needs to balance the next club immediately, in order to get a hand free to catch the

dropping club.

Hard club balance pattern

Hold the clubs as illustrated. Twist the club on which the other balances so that the balanced club flies high into the air. While it's flying, put the twisted club on the club in the other hand, restore the balance, look at and catch the incoming club.
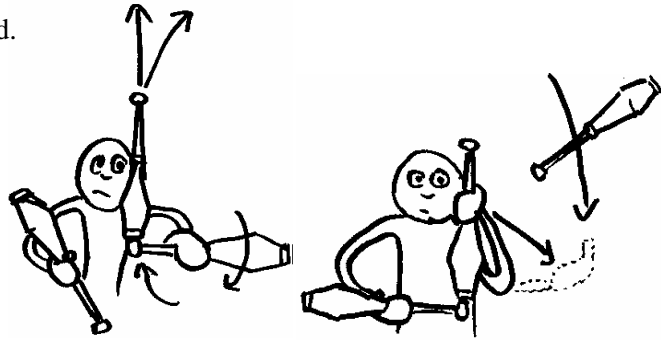
Flat club balance

If you lay a club on its side, you can balance it as a ball.
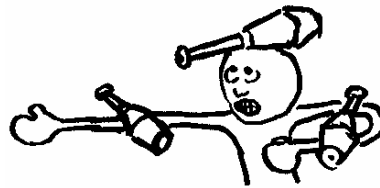
Laying a club on the head
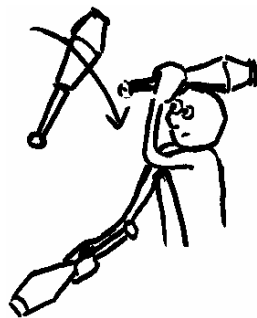
The basic idea is the same as in the ball pattern "laying balls on the forehead", explained above. First train on laying a club fast on your head, and balance it a split second, then let it roll off. Train on the speed of laying it on the head !! Throw high simples (4x's). Catch a club high and move directly up after catching instead of going downwards with it. Lay it fast on your head as in the figure, and let it roll off.
To do the trick in two count, it's important to throw it in a 4x2x rhythm. Throw high simples and hold the club on the head in your hand as long as possible (slow it down).

Back-drop variation

It's not much harder to do the same, but letting the club drop off behind the back. As you catch the club that falls off a lot lower, you catch them later and thereby you can let them drop a little earlier, when they are still fully stable.

Windscreen wiper, headroll, helicopter,…

The headroll and helicopter tricks are explained a bit further. The pattern is exactly the same. By putting the clubs on three different spots, some jugglers manage to do windscreen wipers ultimate (every time, without normal throws).

Working man or turtle

The pattern is about the same. To keep the club in balance on your back, make you back hollow. By doing so your back-muscles will form a gutter around your backbone.

Bend forward and lay a club on your back, do one step forward, move your body up so that the club on your back glides off. Throw with the other hand to catch it, move back down wards with your body, and lay the next club on your back.

Rolls and glides; contact juggling

Ball-rolls

Take hard, perfectly round, heavy, quite large (+/- 70 mm) balls to train rolls.
When training rolls, try to remember when a ball drops off on the one side, and when it drops on the other. Try always to roll the ball on the line between those two dropzones. The more you control the roll, the more you'll be able to feel which side the ball is rolling to, and therefore the better you can correct that and prevent the ball from falling down.
When it works do it over and over again, to get it perfect. Try to keep it perfect while doing something else with the other hand as juggling two in one hand or so. If you use a roll in a pattern, the beauty of the whole thing will be in the perfection of the roll. It needs to be perfectly fluent, if not it looks clumsy.

Backhand-palm roll

Roll the ball back and forth as shown in the illustration. Let it roll between ring- and middle-finger. Try to keep your wrist (quite) stretched at all times. Let the forearm move as a windscreen wiper does. Combining this roll with the forkcatch will make a lot of patterns possible.
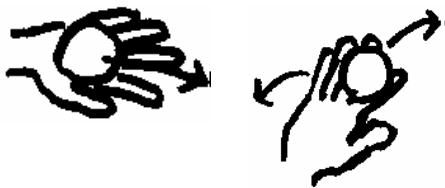
Two illustrations missing
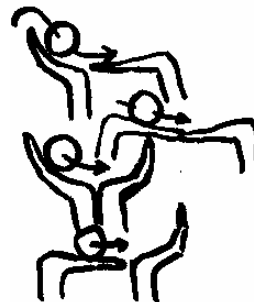
Variations
1) To pass the ball to the other hand, let it roll from the back of your hand onto the palm of the other hand. Flip the hand and let it roll back.
2) Do the same from palm to back of the hand.
3) Do the same going from palm to palm. This is explained in the bridge, a little further.

[4 2][4 2][4x 2] Windscreen wiper
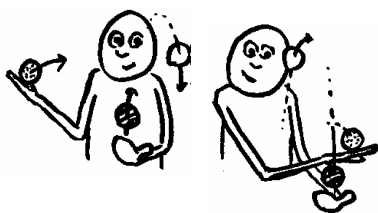
On the first pause roll the ball towards the back of the hand. On the second hold it there for a little moment, on the third, roll it back to the palm. While rolling try to follow the balls juggled in the other hand. Therefore, throw the 4's about as high as the ball rolling over the hand.

The pattern looks a lot better if you cross the rolling hand all the way through the other two balls. It feels better too.
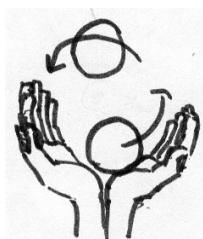
The wheel

Put your hands together as illustrated. Make sure that the palms of both hands are perfectly horizontal by bending your wrists as far as possible.
Let a ball roll from the fingertips of one hand to the fingertips of the other hand. Push it up to the other side, catch it on the finger

tips and let it roll again.

To improve the move, get it more fluently and try to get your hands lower, so that you don't do it in front of your face, but beneath it. Try to move only very little with the hands, and let the ball roll as fluent as possible

Nino Mertens, a friend of me does this fluently with 3 balls, and even gets site swaps in it.

The bridge

Instead of pushing the ball up when it reaches your fingertips, roll it to the back of your hand. From there, roll it back to your palm, to the other palm and flip again.

You can also do the wheel ones, and then the palm-backhand roll or other combinations of both moves.

5 2 5 1 2(4 2), The bridge

Mintan Kaplan juggled this pattern so perfectly that it was the best juggling trick I have ever seen.

LP: **22312**, the same pattern with two balls. On the 1 the ball is rolled from palm to palm, on the following 2 from the palm to the back of the hand. On the third pause (written second here) back to the palm of the hand. The only thing the other hand needs to do is throwing a low 3 just after the rolling hand starts to roll from it's back to it's palm.

The key to this trick with three balls is that you have to throw thin, so that when releasing the second 5, you're hand is exactly were it should be to receive the rolled ball. This little difference really makes the whole thing pop or drop.

You can add a 42, so that you get an extra pause when balancing the ball on the back of your hand.

The trick is a lot more beautiful, and not really harder if you move your hand far when doing the palm to backhand roll, so that you cross over the other arm.

Arm-roll

Try to let a ball roll on your arm, from the hand to the shoulder or from the shoulder to the hand. Try to let the ball stop at the elbow and balance it there, roll it back. All these moves can easily be used in juggling routines as tricks.

2x with arm-roll: The arm roll shower (4x2x)

Hold two balls in the hand that will let the balls roll. Let one roll. Just before it arrives, throw with the other hand a 4x, really low towards the fingertips of the roll hand, and let the second ball roll. Go on.

ILLUSTRATION MISSING

Height 4 with arm roll

If you roll a ball from hand to elbow and back again, and you can catch and throw while doing so, you can use the roll as a height 4. This is a very hard, but very interesting roll. To train it, put one ball on your elbow, one in the hand. Roll towards the hand, and throw, roll back, catch. Balance again on your elbow.

Illustration

Then try the opposite. Start from the hand, roll to the elbow, catch an incoming ball, throw it and roll back.

Try to juggle two in one hand as this (one ball rolls, the other flies). The number of possibilities with this trick are endless. **The french juggler Jean-Seb**, who introduced this roll into juggling juggled (5,4) 2 4, with that single 4 as a roll.

Head-rolls

If you master the catch on the forehead and the temple, you can try rolling a ball from temple to forehead and back. It can take years to master this fully. However some jugglers go even further by rolling from temple to temple in one move, or forehead to top of the head, balance and back,…

Although it is very hard to master, I advise you very strongly to train these tricks, because they are spectacular and are very easily applied when creating tricks and routines.

ILLUSTRATION MISSING

Club rolls

A club rolls as any cylinder rolls, as a wheel or toilet paper roll. Try the same things as you do with balls.

If you roll from hand to shoulder you can end the roll by blocking the club between shoulder and cheek.

Club flip-rolls

To make the club roll, you can use the roundness of your body on which the club can flip. Most such rolls are really cool tricks. In all of them the club needs to keep contact during it's whole flip

To do so, you always need to do the same move. Put one end of the club where you want it to start it's roll (it's possible to throw, but very hard and normally never needed). Most rolls are a bit easier if you start holding the fat end of the club.

Push it straight through. Don't try to let it roll, but push it straight against your body, and let the club roll as a result of the contact with the round limb. Train this first with easy rolls as rolls over your arm, knee, then head, …
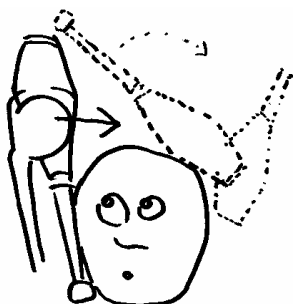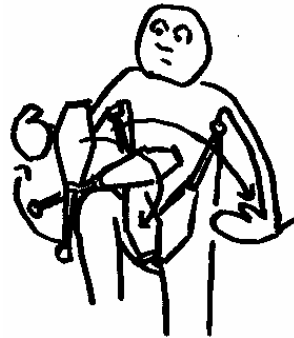
Head-roll

Put the end of the handle under your chin (so not too high !!) and push the rest of the club towards your head. Push it horizontally, as if you want to smash it against your head. If the clubs loses contact and flies a little over your head, it's because you don't push it against your head, but over it. Don't be afraid push it into your face.

Around the neck, and shouldercatch

Do about the same, but now horizontally, around the shoulder. Do it quite fast. After the roll to the other shoulder, you can block the club there between the shoulder and cheek.
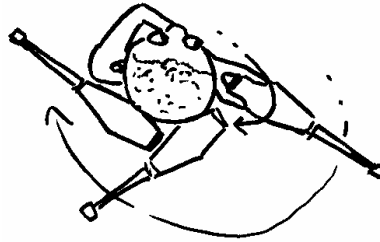
From under the other arm to the shoulder

Try to keep the distance from releasing to the catch-shoulder as small as possible by reaching as far as possible before releasing the club and holding your shoulder (the not-catch shoulder) high.
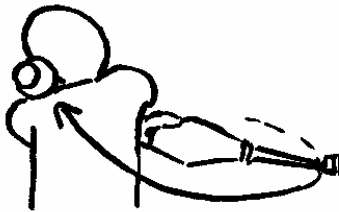
Flip-roll around the belly

Do exactly the same as described above, but now cross your arm behind your back. Again reduce the distance by reaching as far as possible with your hand. If you don't do so, the club will fly forwards after flipping on the belly instead of back to the side of the "roll-arm".

If it works to catch the club with the hand that made the roll, then try to catch the club with the other hand by crossing it behind the back, all the way to the other side. *Manu Laude* used to do this move as a 1 in the 441, quite spectacular.

You can do the same roll, but crossing the arm in front and rolling around the back.

Roll over the shoulder to the back

The hard thing is the catch. Search your club high, or very low.

Back flip variations

If you move your shoulder backwards very fast, after the club flipped, just when the club is vertical again, it can flip back. It's hard but doable.

A very difficult, but really nice variation on this, is one of the hand of *Toby Walker*. After releasing the club, he spins a bit around his ax, so that his other shoulder hits the handle. Thereby the club flips on over that shoulder.
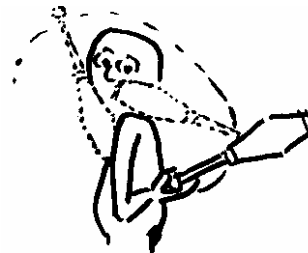
Roll around the shoulder from the back

Hold the club on its very end, and move your hand behind the shoulder and up as high as possible before releasing it. You can catch the club very gently with your arm as illustrated.
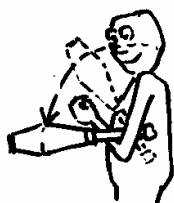
Head propellor

Try to let the club spin one circle before catching it with the other hand. To do so put the club on your head as in the illustration (or a bit higher), and push, as always, without trying to let it spin. Just try it.

A club glide

Instead of rolling clubs, you can also glide. Here's one classic move. Catch the club in the middle with the handle up (a flourish-catch). Turn the palm of your hand up, bend your wrist to lay the body of the club on your forearm, pointing to the outside. Bend your arm, the club should now lay on your arm as illustrated. If you then let the club go, it will glide on your arm, and you'll have time to stretch that arm and to make a penguin catch.
(more illustrations needed)

Arm movements and club-swings

Arm movements

Doing certain arm-movements on pauses when juggling can create really nice effects. Simple things as making circles around two balls juggled in one hand or so can be really nice.

Weave

Small circular movements, not around other balls
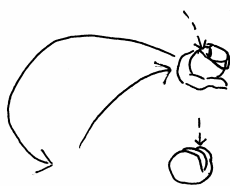
Barrage

An arm that has caught on the other side of the pattern goes back to its side

Orbit

A hand orbits around an air ball. This movement is done in the other direction than the barrage.

Chops

This is an important throw to learn. Not because the variation itself is important, but because you learn to catch your club (or ball) higher than normal, to do something with it. This you will need for instance in variations where one club is spinned or laid on the head.

Catch your club higher than normal and try not to go down with it, go up at once. Go up (and over the next club), go down and throw.

Better illustr needed

To do this while juggling three clubs, you should do this so fast that you come down, next to the other hand on the moment that the other hand catches the third club.

If the club that is thrown under the chopped club is high and slow spinning, then there's enough time to do the same again on the other side.

Chops are a lot more beautiful if you let them make a swing instead of holding them stiffly in your hand.

One club swings

Swinging is normally done with two clubs, but if you use swings when juggling, you normally won't have both hands free. With one hand free, this are some possibilities:

Drop swing:
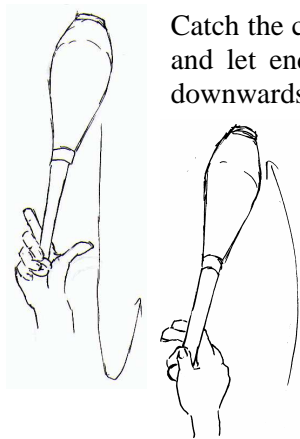
Catch the club on it's very end, between thumb and pointing-finger (??) and let end swing downwards as in the figure (let it free, let it fall downwards, but hold its end).

Help the club swinging on until you hold it back good to throw it.

The drop swing is the easiest of a whole group of swings, who can all be done very elegant.

Reverse drop swing: After catching, start swinging upwards. Now the throw after it will be easier.

Belly-cross swing: catch the club on the other side, with a crossed arm, and lett it drop swing on the other side of your body, next to your other shoulder, but keep the spinning plane.

Orbit swing : Swing in the shoulder plane, with your right hand clockwise. This is normally done when catching a reverse dip, as in Mill's mess or rubensteins revenge.

Barrage swing: Again shoulder plane, now other direction, usually when catching something with a crossed arm (Burke's barrage f.e.).

Shoulder-barrage swing: When doing the previous one, you can swing ones behind your shoulder when coming back to your side.

Hip-barrage swing: You can do the same, but swinging lower; behind your hip.

Two club-swings

Swinging is a club (rope, poi or stick) discipline in which generally two clubs are swung in brilliant circles around the body. The patterns I will here explain are patterns I'll lateron will need to explain Mikes mess, a flashy three club pattern.

The beauty of the patterns is due to the fluency it is done with.

Mills Mess swing (3 count swing)

Swingers will probably hate me for this name, but this book is meant for jugglers. So I gave it the name of the same arm-sequence when juggling three props.

Hold one club in each hand, at the very end of the club, between thumb and fingers. Hold it loosely. Stretch both arms in front of you, cross the right over the left. Swing the right club on your left side, one circle, starting downwards. Try to bend your arm

as less as possible, and don't bend your wrist. Let all the movement come from the club. Then do the same with the left club, Also on the left side. At the end of that swing, cross your left arm over your right. Now make a third swing, again with the right arm on the left side, but now under the left arm. After it you end up in the mirror image of the start, and you can do the same thing on the other side.

Mark that you are actually doing the Mills Mess with two clubs. You swing crossed above, uncrossed, crossed under.

Once you can do this, try not to speed up your swings, but try to reduce the time between the different swings. Do everything slow, think while swinging slow, so that you never have to stop anymore, so that you can continue swinging. Don't forget the third swing, the swing under the other arm.

Ones you can swing this pattern slow, but without stopping, it will be a piece of cake to do it faster and more fluently. Try to stretch your elbows and wrists, let only the clubs swing.
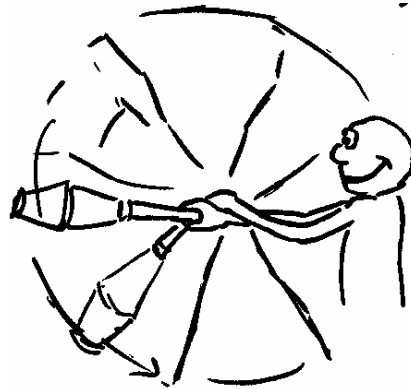
6 count swing

In this pattern the right hand always leads, and the left hand just follows what the right hand does.

Start the same as above. But now don't cross the arms after the second swing. Stretch your arms fully, and make a swing between your arms, in front of your face. So again right, immediately followed by left. Then the right arm moves to its side, swings over there and the left follows again and swings under it. The right hand moves back to the left side and you can start all over again.

To get everything fluent, do the same as explained above. Of course you can combine both patterns explained above.

Reverse Mills Mess swing

This is harder than the normal swing, and it doesn't looks better. You should only learn it to do half pirouettes when swinging or juggling Mike's Mess.

Actually you just have to do the same as in the normal Mill's Mess swing, but in reverse (reverse is what you see if you look at a video played in reverse). So start with a swing under the arm, starting with swinging upward. Continue like this, it should point out itself.

Fingertricks and hand-manipulations

This are club possibilities, you can do them on pauses (2's). The following tricks are the really classic ones, there's a lot more possible, especially if you allow complex manipulations that need more than one pause. But that's up to you.

Flick, Flip

A club is thrown very low and with a lot of spin. It is more the handle that is pushed downwards very fast, than it is a throw. Try to train it blind, cause when juggling you will be looking to you're other clubs. If you want try a reverse flick too.
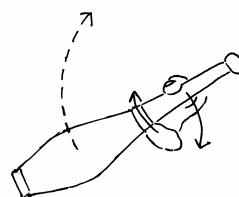
If you wanna do the flick while juggling it's important that the club that you catch to do the flick with doesn't overspin. It should fall into your hand with the handle still up and the body downwards (see illustration). There by you don't lose time to get the prop into that position after catching it. Especially for flicks in simples this loss of time will kill it.

Half flick, Slap on

It is possible to catch a club on the wrong end and then to correct it by a half flick. This can be done as a correction, but also as a continuous variation.

Flourish

A flourish is an impressive trick and isn't very hard to master.
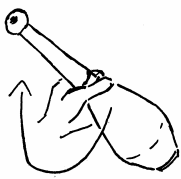
Catch an incoming club as shown in the illustration (handle upwards). Push the body of the club towards yourself with your fingers. While the clubs spins, turn the palm of your hand upwards, so that the club can spin on untill the body of the club lays on your fingers.

Then let the body drop between index and middle-finger.
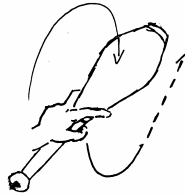
Now do the same as described in drop swing but hold the club with those two finger.

When catching the flourish, mark that you hold it nearby it's center. This is very important if you need to do the flourish fast and fluent.

Double flourish

It is possible to combine flourish and some kind of vertical finger-loop, but it isn't very nice nor useful. I'll explain it anyway.

While the club is spinning between index and middle finger, let the handle drop between middle-finger and ring-finger. Turn the palm of the hand downwards as normally, but now let spin ones more.

The body spins down and back up as in the beginning of the flourish. Now stop spinning or continue as you which.
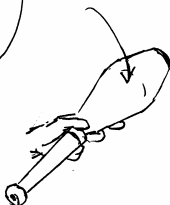
Loop

This is a very beautiful finger-trick, but it is hard to master. Ones you get the hang of it, it will become easy (be patient).

Hold the club near its balance point. Push the handle towards the other hand with your thumb, so that the clubs begins to spin.
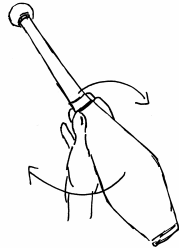
The club-body will move towards the thumb. Move the thumb under the club, and let it spin on the back of your hand for a moment.
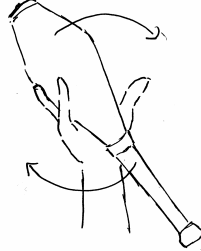
Then turn the palm of your hand back up, and catch the club again in its starting-position. Do this until it works smoothly.

Then try not to catch it but to push it immediately again to make a second spin. And catch. Try to do more and more spins before catching again. The key to master this trick is to make a circle with the thumb. While the club spins on the back of the hand, the thumb must complete the circle. Ones it works good you will see that the club never touches the palm of the hand anymore.

Patterns including no consecutive pauses in a hand will only need one loop. The loop is much nicer if one hand gets consecutive pauses, like in 42424242… Then you can do loops continuously.

There are some variations possible with loops. First, you can throw the club when you push with your thumb. The club will fly as a helicopter.

Second, you can change into and out of fake loop.

Third, after pushing hard with your thumb, you can let the club spin on the palm of your hand until it stops.

You can learn reverse loop (both other direction as other end of the club).

Fake loop (finger loop)

Instead of doing the normal loop, you can also let the club spin between your fingers. I generally like loop more, but you need this one to loop above your head.

MORE EXPLANATION AND ILLUSTRATIONS

Hand-roll

Catch an incoming club nearby its body. First turn its spinning plane in the plane of the shoulders, back of the hand upwards. Then turn the hand-palm towards the other hand and open your hand.
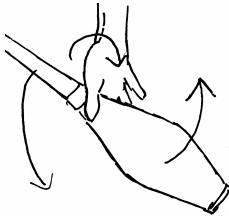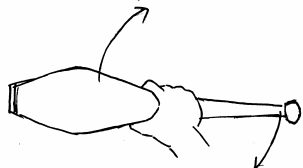
Let the body of the club roll over the back of your hand while turning your hand-palm to the other side.
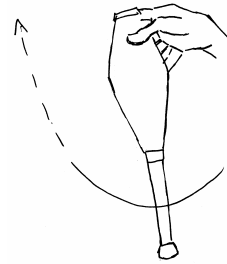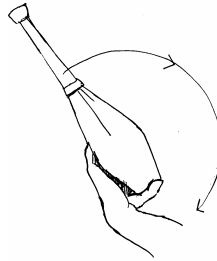
Catch the end of the body, turn your hand back normal and throw the club.

It is also possible, to catch an incoming club on the end of its body and then to do everything the other way around. Then you catch the body and end with throwing, holding

Throws

Holes, Zero's

Height zero is a hole in the pattern. A hand is empty for one count. Zeros are normally used for pirouettes or half pirouettes, or to learn new patterns (55550 to learn five balls, using only four).

For some variations as ultimate backcatches you need an empty hand for a little moment to get behind your back. More about such mini-zeros in part one, lesson 8.

Snaps (1 or 2x), self-snaps (2's), drops …

Normal snap, zip

A snap is a fast throw to the other hand. So fast, that it doesn't make any arc. A self snap is the same, but the prop is caught in the same hand (because that hand moved even faster). As a variation you can snap behind the back and behind the neck.
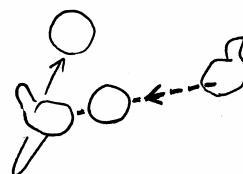
With **clubs** you can snap normal, or hold the club vertical and snap as a windscreen wiper. You can also change end that you hold. You can catch a club on the "wrong" side, and grab the handle with the other hand while you snap it.
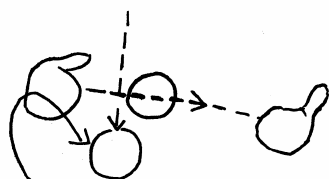
Shuffle

Shuffling is snapping above the incoming ball. It is especially hard if you want to do it on a 2x. Then, it's best to desynchronize, to throw the shuffle a split later than the throw with the other hand.

Self snap

A self snap is a similar throw, however by moving the throw-hand, the prop is also caught in that hand.

Nice ones are: around the neck, shoulder, belly,…

Illustrations

Drop (balls)

A passive drop will result in a 2x. For a 1 you'll need to give it some speed downwards. If you pop the ball up a little when releasing it, it can be a 3 or a fast 4.

Patterns in which drops are used are called machines. So for patterns with drops, look at machines in chapter 8.

Illustrations missing

Self drop

Drop and catch in the same hand. Under the other arm or behind the other shoulder-catch are tricky variations.

Place-of-throw variations

Cascade and fountain throw

A cascade throw is a normal throw from one hand to the other hand. It's done from the inside to the outside, so from in front of the the outside.

A fountain throw is a normal throw to the same It's also done, from the inside to the outside.

belly, to

hand.
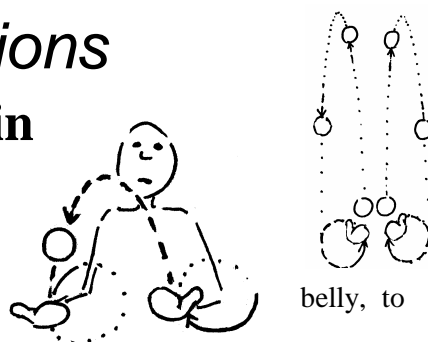
Cascade throw

Six ball fountain

Reverse cascade and fountain

Reverse generally means that it is what you would see if you watch a video in reverse. So here it means that the catch is made on the inside, and the throw on the outside, towards the inside.

To start juggling reverse out of a normal pattern, juggle the pattern thin and a bit low. With clubs, it is hard and ugly. Throw reverse dip instead.
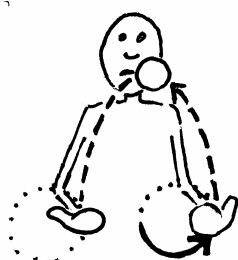
Column

The prop is thrown straight up, so where the throw was made. If all as columns, a wall effect is created. (Mark that if you throw a column can be a throw to the other hand)
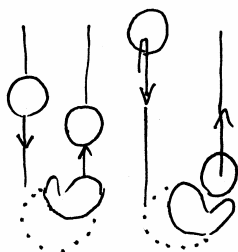
the catch is made the props are thrown

throw in the centre, it

Crossed arm throw

You can throw from under the other arm, and from above. You can try this one before trying the next throws.

Under the leg

There are several ways to throw a prop under the leg. From-in-to-out is most common, and illustrated, but you could also throw under that leg with your other hand.

Back-cross

Always keep your hand close to your back, if not the props will fly forward. When learning it, go far up with your hand (if not the props will fly outwards), until your under-arm is about horizontal, and the hand in about the half of your back... For very fast backcrosses (as in 5 clubs in doubles), you'll need to go less far behind the back. Try not to bend your back (especially not sideways) when throwing. Keep the pint of beer in balance on your head while throwing the back-cross.

Back-crosses are visually more interesting with **rings** or **clubs** because the spinning plane changes.
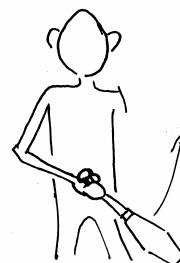
Many jugglers let the **club** glide to its end before throwing it. I advise you to do the same, but there is a choice. *Anthony Gatho* says you should do so, but with 5 clubs he doesn't does it himself.

It takes a little more time to throw a back-cross, therefore in the beginning, you will need to throw higher before you do the back-cross. The backcross will become more useful once you can do it in the rhythm of your normal cascade.
The back-cross itself needs to be at least as high as your shoulder. Therefore with **balls**, a back-cross on height 3 will be hard unless all the heights are thrown a bit higher. For clubs this isn't really a problem.

Once you juggle backcrosses continuously, it's important to choose a point to look at. You can swing the head to see all the props, but you can also look straight up. You'll see the props fly in the corner of your eyes. I like this method more as it gives a more peaceful look, but in the beginning, swinging your head will be easier.

An **armpit backcross** is a special type of back-cross in which the arm needs to reach much further. The crossed arm often stays crossed for a couple throws. An armpit throw can be very low. Therefore height 3 gives no problems.
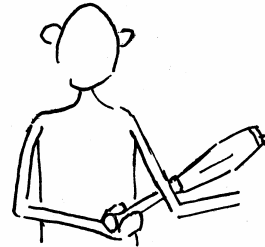
With **three clubs,** ultimate backcrosses are easier in doubles. If you try doubles, don't throw them too fast after each other. Take your time for each throw. Most jugglers throw too fast, or bring their arm too early behind the back to hold it there for a moment. Then they throw the club with an arm that is already behind the back, what is a completely different exercise than a normal backcross. It looks less fluent, it's less precise and variations as weaves or so aren't possible. So don't do it. To avoid it, you can start juggling normal doubles and keep the pace once you start backcrosses.
To learn ultimate simples, it's of major importance to throw slow spinning simples, and to slow the cascade down (4x2, binary juggling). With doubles it's easier to do 4x2 variations as the weave, but if you train enough, they'll become possible in simples too. For club weave it's better to throw low, little spinned clubs, then high clubs that spin a bit too much.

If you search for variations on backcrosses, before all, be aware of it that backcrosses fly in the shoulder plane. Therefore variations that also use that plane will look better than others. Club-weave looks much better than flourish Fe. Switching from backcrosses to reverse dip is another shoulder plane combination that looks nice (for more stuff like this see chapter 13: Mill's mess).

To do very fast backcrosses, as in ultimate **five club** backcrosses, you need to throw backcrosses without going far behind the back. You should throw them almost without going behind the back. But don't start with this technique; first learn a normal backcross, going at least until your spine.

Cartwheels, schoulderthrow, around the shoulder

If a prop is thrown around the shoulder it is called a cartwheel. Try this first with one ball. Catch it normally. Then stretch your arm while turning the palm of your hand backwards. Make sure that your arm is fully stretched when he's vertical. Throw the ball up behind your shoulder. Club jugglers will need to glide their clubs.

Crotch throws: Iggy's or Albert's and treblA's or Sergey's

These are throws under the leg, without lifting up a leg. Alberts or Iggy's, go from front to back and treblA's or Sergey's go the other way around. To be able to make the throw, clubs need to be glided before throwing, so that you can hold them at their very end to make e the throw. This reduces precision a lot.

Two classic, very hard variations are: **Six-ways**: Albert-backcross-trebla and **Four-ways:** albert-trebla-trebla-albert.

Albert's and treblA's are called after Albert Lucas who popularized them in the States. Iggy's and Sergey's are named after Sergey Ignite, who actually did them earlier (and better).

Above the head

For **balls**, get your elbows high and wide up, and your hands next to your chin. Keep your elbows high and you're hands low while juggling. Remember to make nice throwing circles and try to throw in one plane.
With balls, ones you master the throws, it will become natural. You'll be able to do site swaps, four or five balls...
I saw *Anthony Gatho* ones juggling 744 (a five-ball pattern) as this, and then throwing a 96622 pirouette, continuing 744 above the head after it.
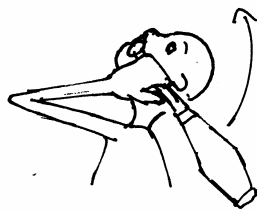
For **clubs,** get your elbows high, but now not wide. Keep them parallel. Catch your club's near the centre.
It's a good exercise to throw tomahawks (passing trick). Mark that the clubs spin reverse. This is interesting in combination with half pirouettes, reverse spin or cartwheels. You could for instance juggle reverse spinning clubs and move the pattern slowly up (as far as you can) and then switch to juggling above your head.

Speed-of-spin variations (clubs)

With **clubs** you can choose the number and speed of spins. As slow spinning clubs are easier to catch and generally look better, the spin is often reduced. Slow spin makes a pattern slower, what makes throw variations possible. Because very slow spin gives a very elegant look, some jugglers will reduce spin even more, what increases the difficulty.

This table gives some more information:

Height	Expected spin	Easiest spin	Extra reduced spin
3	1	1	0
4	2	2 or 1	1 or 0
5	3	2	1
6	4 ?	3	2 or even 1
7	4 ?	3 ?	?

Doubles, triples...

With clubs, the first trick you should learn is throwing a double. Try to let the club spin just as slow as those that spin ones. Try to make it spin twice, only because you throw it higher (a small two meter from hands to top).
Ones you can do it ones, try to throw more doubles, until you can juggle continuous doubles. Then try the flash (55500), and try a triple. Learn easy patterns that require doubles as: two in one hand, columns ([44] [40]) and 441. Try to use the pause you get by throwing a double (4x2 chapter 5).

Extra spin
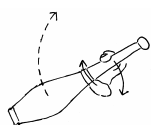
It is flashy to throw torches with fast spin, but you'll see that it becomes boring very soon. Very fast spin gives a nervous, amatouristic impression. On the other hand it isn't very hard to do, and it can be impressive.
Throw the clubs with a wrist spin and, to make them spin even more, your thumb can push the handle downwards as in a flick.

Toby Walker is an extraordinary good juggler who masters five clubs on every possible spin. One of his most impressive tricks is a five club cascade juggled in extremely low, extremely fast triples (or was it quads), which changes into a five club in flats at once.

Reverse spin

To reverse the spin of a club you need to turn the club vertical after catching it. Then throw it by pulling the handle towards you and upwards.
When juggling continuous reverse spin, problems usually arise because a club doesn't spins enough. So always give a bit more spin than needed
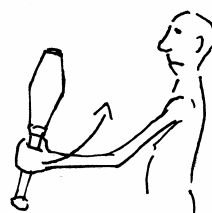
If you juggle above your head, the clubs also spin reversed. Therefore, it is possible and nice to go slowly up from reverse spin into above the head.

Vert's (vertical thrown clubs without spin)

Hold the club vertical, and throw it vertical as in the illustration.
This isn't very hard to do if you can already do reverse spin.
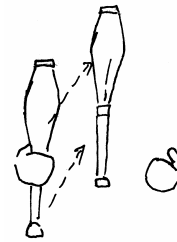
Flats

Flats are also clubs thrown without any spin, but they are a lot harder to do, and much more beautiful.
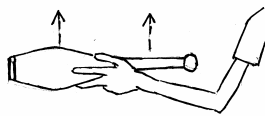
Hold the club horizontal, and throw it horizontal. To do so, there are two methods that can be combined. The first one compensates the spin of the under arm by making the opposite move with the wrist. It feels as if you push your wrist up.

A second method releases the club early, but pushes the handle still a bit up. It seems strange if you hear it, but try it. It works best when you hold the clubs at the very end. I guess it's best to combine both methods.

A third thing that can help is letting the club spin around its ax. This is handy if you got a lot of time to throw a very high flat. (With cylinder formed objects, which have the weight on the cylinder, as tubes or bottles, spinning will help a lot more.)

Extra reduced spin

Extra reduced spin is used to throw three, four or five clubs in very high simples, or five in very high doubles.
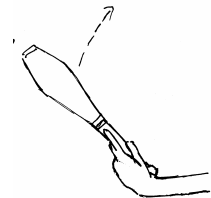
The method to throw such high simples is the same as the methods to throw flats, but less extreme (bending the wrist in the other direction while throwing). Therefore it is very useful to learn three clubs in flat.

It also helps if you hold the club fixed as illustrated when throwing it. **Denis Pommier**, who masters one of the highest and most clean five in simple of the world uses this last method

Plane-of-spin variations

A club can spin in three different planes; the normal plane or plane of the nose; the plane of the shoulders, and the plane of the floor (helicopters).
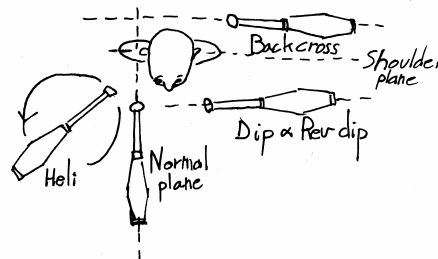
Flat front: Dip and reverse dip (Also called: "soleil" or open throws)

These throw variations are quite easy, and are really interesting. Especially reverse dip is impressive.
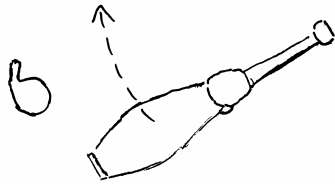
To throw a dip, after a catch the hand needs to turn the prop in the direction of the shoulders. Spin is given by a twist of the underarm. Left-above is a dip throw, under it a reverse dip throw.

Reverse dip is a bit harder. With clubs you'll need to let them glide to the end of the handle.
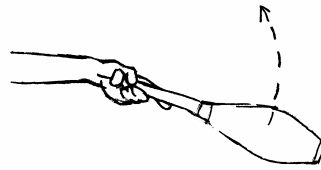
Catching dip or reverse dip throws can cause problems because the handle spins in or out of your hand when catching the club.
As you can see in the illustration, in fountain throws (to the same hand), dip spins in and reverse dip spins in, while it is the other way around with cascade throws.

There are two ways to deal with that problem, both interesting to learn.

Method one, catching with your arm up, so that the clubs spins into your hand again is mostly used in continuous reverse dip-patterns. (See right side →)
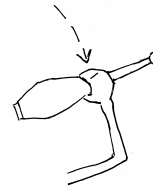
Method two, catching in the centre or even a bit over it, so that spinning out doesn't bothers, needs a little more spin and is normally used in showers.

When juggling two-in-one hand in reverse dip, collisions are avoided by throwing a bit to the front so that the next prop can be thrown behind it..
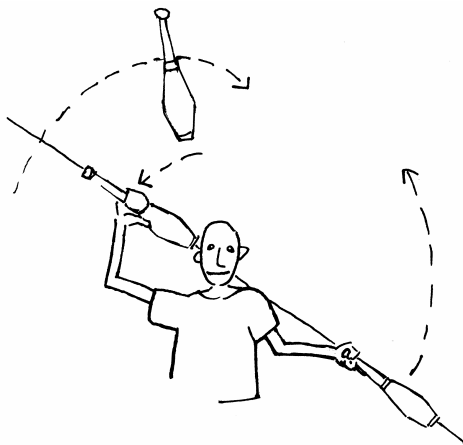
Ultimate reverse dip looks very nice. It fills up a lot of space and is therefore a good trick to fill up a large stage.
To learn it, it's easiest in doubles. Once you master it go for simples too. If you master them continuously, it looks really good. Especially if you hold that you will throw on the same line as the one you catch, as in the illustration.
Try to do the same (holding the clubs on one line) when you do the reverse dip shower, with the shower catch.

Handle-heli and wrist-heli

The club flies as the blades of a helicopter. "Heli's" is a typical example of trick that you need to do perfect or not at all. The least bit of irregularity, makes it look really bad.

The easiest way to throw a heli is by using the wrist. Hold the club as illustrated before it's thrown. Then when throwing, twist your wrist. A right hand heli spins clockwise.
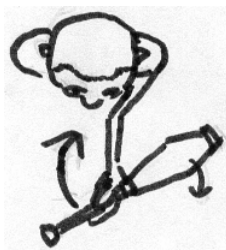
However, to juggle ultimate heli's, most good jugglers use another harder, but more precise technique. Before throwing twist the wrist a

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bit in the other direction, as illustrated, cross the arm to the other side (more than in the illustration) and then when throwing, pull the handle of the club towards yourself. A right hand heli now spins counter clockwise.

Catches

Most catch variations require a special throw. Such variations (as backcatches) are explained above. Some that don't (or not really) need a special throw are explained under.

Catch variations are as important as throw variations. Not in the least because catches can be done as stops. More about catches in the Multiplex chapter.

Place-of-the-hand variations

Under the arm catch

This seems really trivial, but try doing it ultimate (on every catch).

Neckcatch

Throw a prop so that the catching arm needs to cross behind the neck, to catch it above the other shoulder.

Backhand-catch (balls)

It's possible to catch a ball on the back of your hand. The most important thing, is to move down when catching the ball so that it doesn't bumps off your hand. After such a catch you can do a handflip or throw from the back of the hand.

Penguin (balls)

Make sure your arm is stretched. Catch with your fingers, far enough away from your wrist. If you do it continuously, try also to throw with stretched arms.

Back-catch

A prop is thrown in front of the body and caught behind the back. This is much harder than a back-cross. There are some little different methods to throw back-catches.

Shoulder plane is easiest and generally possible. Rings are always thrown in the shoulder-plane, and for clubs it's a lot easier too, because normal plane requires extreme low spin.

Normal plane looks better with balls, but is much harder.

Ultimate backcatches are extremely hard. You need time between throwing and catching (juggle ternary, part I, lesson 8) to learn ultimate backcatches with clubs, Mill's mess behind the back helps a lot.

Bud-catch

If you want to do this while juggling you'll need a double pause after it. Catches like this may seem impossible, especially while juggling, but if you really want, it's possible. *Jason Garfield* does this catch while juggling six balls, or four clubs.

Illustration missing

Claw-catch, or cat-catch (balls)

Catch a ball by clawing it from above. This is easier if you do it some higher and more spectacular if you do it lower.

Body-catch variations by blocking

Shoulder-neck catch

Try to catch by lifting up the arm or shoulder instead of bending the head. This is a very nice catch if you catch a high prop simultaneously in the high hand.
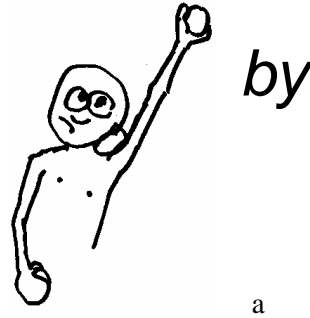
A variation on this one is the chin-chest catch

Knee catch

I have more feeling in this catch if I stretch my foot. With clubs, mind the spinning plane. To learn it I guess it's best to throw in the nose plane and adjusting the knee position to it. Ones you feel that, you can feel the other planes.
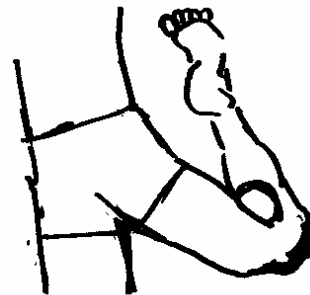
Club foot catch

See further in pick-ups.

Body catch variations by balancing

You can catch a prop where ever you can balance it. Balancing it is always the easy part. How to get from balancing to catching is explained higher in: Balance.

Ball fork catch (back of the hand)

It's easiest to catch the ball on your middle and pointing finger. Therefore stretch them completely and move downwards when catching. Then try to throw the ball again.
A nice aspect of this catch is that you can hold a ball in your hand while catching one on the fork. That makes a lot of multiplex patterns possible. To do them fluently there's a secret to it. Always make the normal catches with only three fingers: your thumb, ring-finger and little finger, so that you can stretch your other fingers just after the catch to fork-catch a second ball.

There are some classic easy fork patterns in the multiplex chapter.

Foot catch (balls)

It depends a bit of the form and flexibility of your feet and toes how hard it is to do this catch. But generally, it is very hard. However, bending your toes up improves a lot if you train on it.

First train on keeping the ball stable when swinging your foot back and fort. Then to catch, the most important thing is to break the drop of the ball by moving your foot down when the ball falls on it. It's hard, and it never comes easy.

Morgan Cosquer, ones had a terrible accident. His hands and arms were so badly injured that he couldn't juggle them for a long time. However he continued, training his feet and head. Right now, he's a world master on foot catches and throws.

Elbow catch (balls)

This is a useful trick. Stretch your arm fully. Throw low, so that you can catch when the ball peaks.

Neck catch

Look at the descending ball as long as possible; only bend under it on the very last possible moment. Ones under, try to look up, and keep your shoulders high, so that the ball stays stable in your neck.

You can throw the ball out of there again by letting it roll over your head and flipping your head up on the same time.

Illustration missing

Club catch variations

Flourish-catch or flairbottle catch (clubs)

Catch as illustrated. It's logic to do a flourish after catching as this, but there's more possible.

Illustration

Club-body catch

Catch the other side of the club

Handle-catch (clubs)

This is a variation that comes out of devil stick juggling. The are a lot of variations possible on it, but the basic handle-catch is explained in the illustration.

MORE about this needed
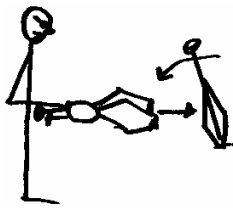
The fork (Clubs)

The fork is a nice, spectacular club catch, but it's more than that. It is a way to block a club out of which there are an endless number of possibilities. You can throw out of the fork, kick, bounce, re-fork, multiplex, swing to a balance...

Learning the fork itself:

Illustration missing

Hold to clubs as illustrated above (two clubs held in a hand like that is cold circus-grip, more about it in the explanation concerning multiplexes in Part I).

Turn the back of your hand upwards. When holding them perfectly you should control the pressure between the two club-bodies. Throw a third club, let it spin normal (or a tiny bit less), and fork it with your fork. If this works do the same but throw the club double spinned. Then learn top put the two clubs into the fork position really fast, the second club needs to be put into position in one fast move. If this works, throw a double while juggling, get your fork in position, and fork the incoming double. While forking, keep the club-bodies loosely to each-other, after forking, press then strongly to each-other.

Variations and possibilities:

Throwing the club into the fork

You can stop throwing with one hand, and catch the incoming club circus (so that you hold both clubs in circus-grip, see how in multiplexes). After that, you can throw the third club into the fork.

As this is easier once you can do the circus catch, you can do more difficult forks as throwing the to-be-forked-club before you catch circus, forking behind the back or neck.

When doing such hard forks, your forking hand usually can't move, and therefore can't fork. If so, don't try to fork, but let the incoming club drop into your fork and keep he pressure between the club-bodies of the fork as low as possible, try even to open the fork, so that the incoming club falls smoothly into the fork, instead of bouncing out of it again.

Throw out of the fork

You can swing a club out if a fork. If you do so, you'll need to pull the fork back just before the forked club flies out o it, otherwise it will fly too much forward.

After throwing the forked club, you can throw both forked clubs together, as a multiplex, or one by one.

Reverse fork
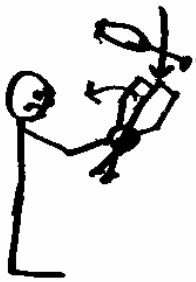
When an incoming club spins reversed, it is harder to fork it. Just after forking it, you need to turn the fork upside down, otherwise the forked club will fall out.

After turning your hand, you have a reverse fork out of which other possibilities arise.

Bounce out of the reverse fork

A classic exit out of the reverse fork is smashing the forked club on the ground, flat on its side, so that it bounces back up and can be caught into a normal fork. If you do so, try to push the handle down wards as much as possible and reach low before releasing the club, otherwise it will spin too much before touching the ground, and therefore it won't bounce (read bounces, a bit further in this chapter).
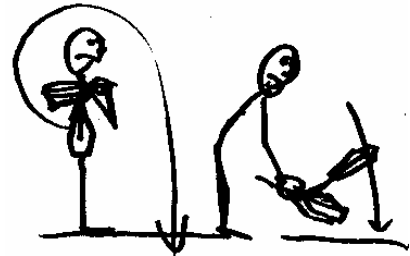
Fork to balance

Swing the forked club up as if you would throw it, but less hard, so that it just comes straight up. Balance it there.

Multiplex out of a fork

Instead of throwing a club out of a fork, and then throwing the fork itself, you can throw all three on the same moment. If you pull the fork towards you just before releasing it, the forked club won't fly away and spin twice while the other clubs spin just ones.

Lazy's

A lazy is a very hard way of catching a reverse spinning club. The catch is done behind the back as shown in the illustration. Cartwheels are mostly used to do lazy catches, but other reverse spinning throws as Iggy's or above the head throws are also possible. Normal spin caught after a half pirouette or backcrosses after a quarter pirouette can be caught lazy too, and are very flashy.

Illustration missing

Toby Walker does a 4 cartwheel lazy in 423, on the 2 in the other hand he manages to do a fluent drop swing. As most of his tricks, very clean, very nice and very hard to do.

Pick ups, kick ups and drops

There are a thousand different ways to pick up a prop from the floor. Train the classics and search more yourself.
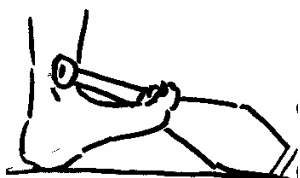
The classic club kick up

Lay the club on your foot as illustrated. Block it between your little toe and your ENKEL , therefore lift your toes. If you move your foot back-outwards, the club needs to move along.

To kick the club up, you need to kick in that same direction. While your foot goes up, your knee may not go up. The knee needs to stay in place. It's a bit as if you want to hit your bud with your heel. Kick it up hard, and let the club spin ones before catching it.

The better the club is blocked, the better you can control it when kicking it up. Therefore, it is easier on bare feet or light shoes.
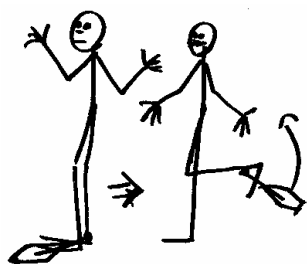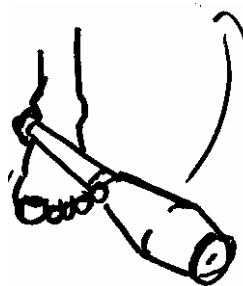
Of course, train on rolling the club onto your foot, with the other foot instead of laying it on the foot with your hand. If the clubs handle is facing away from you, you can flip the club on your foot by pushing on the fat end with your toes.

Improve your kick by training high kicks, fast spinning kicks, kicks to the front and to the back,…

Variations

Floor catch and kick up

The next thing to train is kicking up a club that you drop-throw onto your foot. To do so, your foot needs to brake the fall of the club, and the club needs to fall onto the foot so that it gets blocked as it needs to be to kick it up. The easiest way to get the club blocked is by throwing it as a helicopter. If you throw to the other foot, a wrist-helicopter, if you throw to the foot on the same side, a handle helicopter. A flat is also easy, and a simple spin as doable to. Try to get the club blocked as fast as possible, preferably still in the air, when braking the fall of the club.

Air Catch and kick up
This is a spectacular trick, and very much worth the effort. When you manage to get the club blocked in your foot, still in the air, you can kick it up without it touches the floor. This seems quite impossible, but it's not really that hard. Especially if throw nice heli's, the club will spin itself into the foot-block. Then it's only a matter of timing.

Slow or fast spin
To kick slow spinning clubs, try to give a lot of speed to the club in the first part of the kick, and let it fly early. To give really much spin, use the same technique of throwing flicks (fast spinning clubs). Instead of pushing the handle downwards with the thumb, here when the club's about to fly, kick your foot down again. Thereby you'll kick the handle downwards, and the club will spin very fast.

Double kicks
It's hard but possible to catch a kick up with the foot, and then kicking it up again. To do so, you'll need to kick slow spinning clubs.

Crossed legs kick up
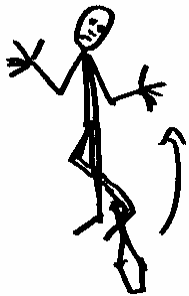
If a club lies on the foot as illustrated you can kick it up on two ways. Cross your other leg in front, and kick up behind that leg. You've got little space, but it's doable.
You can also cross the free leg behind the kick-leg. This is easier but al lot less beautiful.

Bobby May (1907-81), one of the fathers of modern juggling did this fluently in 2 count (somewhere in the 1930's).

Multiplex kick up

Lay the clubs as illustrated and try to kick them up. To keep control of the clubs your kick up needs to be very fluent, gradually fastening while kicking.
Danny Ronaldo, of Circus Ronaldo, throws his three clubs, one by one on his foot, kicks them all three up and juggles on.
Luke Wilson, starts his five clubs with a triplex kick up.
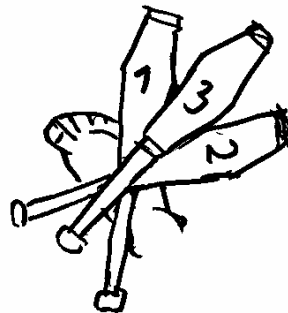
Other kick ups
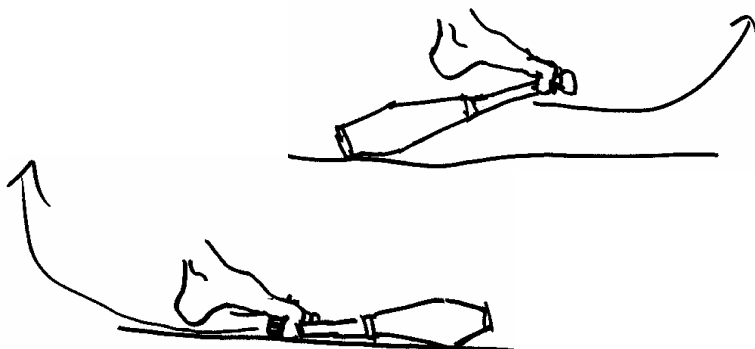
Bounces and floor rolls

Everything about ball floor bounces is in chapter 7.
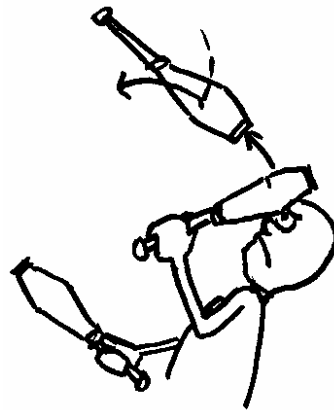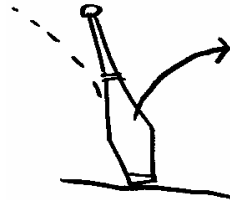
Back slam or slam back's (clubs)

Throw a club so that it spins a bit more than half, and hit the body so that the club spins reverse, catch the handle.

Reverse slam

You can do the same with a reverse spinning club. As you hit the club downwards, throw a bit upwards. As the club will spin normal after slamming in, you can try a normal back slam after it (or the other way around).

Full slam

You can slam on the handle and let the club make a full spin.
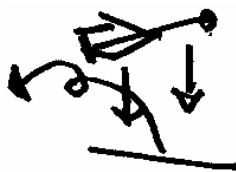
Club bounce on its side

A club will only rebound if it touches the floor with both ends on about the same moment. There are three possible rebounds. The part of the club that hits the ground latest will go up first, and fastest. So a club can spin body upwards or handle upwards depending of the angle when landing. If both ends hit the ground on exactly the same moment, the club will go up horizontal.

Hold a club flat, let it drop and test these three possibilities. To get the club bouncing high enough, you'll need to throw it to the floor. The easiest way is doing that without spin (so a downwards pushed flat). I also like to let the club make a full spin, but it's a little harder.
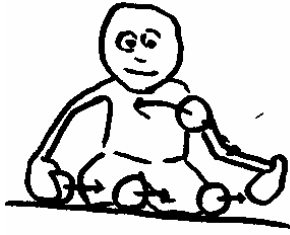
Rolling balls

If you work with the floor, don't forget that you can roll balls on the floor.

Rolling clubs

Because a clubs rolls in circles on the floor, it comes back after pushing it, you can do the same patterns as in the air.

Chapter 2: **Basic patterns**

What are basic patterns ?

In basic patterns every hand throws to the same height, always in the same rhythm.
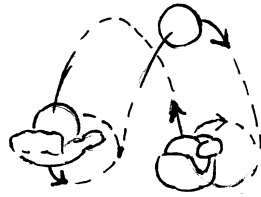
Importance

Training basic patterns is very important if you want to become a good juggler. It will improve your perfection a lot. To juggle the difficult three ball variations, you'll need the perfection of a five-ball cascade.

Further, basic patterns are an inexhaustible source of variations. Especially, with three props, the basic cascade is the key to a whole ocean of variations. However other patterns shouldn't be forgotten, but that's another chapter.

Basic patterns are usually the easiest to juggle a certain number of props. People who train only on basic patterns without variations, who only want to throw as much props as possible, are called number jugglers. I don't advise you to do so, because there's so much more… But if you insist I'll give you something to focus on; a list of official world-records (they need to be taped). You can find the latest updates on juggling.org.

DATED, I'll put the latest version just before editing

Balls				
7	Anthony Gatho	3 min 56 sec	1989	IJA Convention
8	Anthony Gatho	172	2001	To be the best II video
9	Anthony Gatho	110	2001	To be the best II video
10	Bruce sarafian	23 catches	2001	Personal video
11	Bruce Sarafian	15 catches	2001	Personal video
12	Bruce Sarafian	12 catches	1996	Personal video
Clubs				
5	Anthony Gatho	45 min 2 sec		Personal video
6	Thorsten Barucha	1 min 8 sec		Personal video
7	Anthony Gatho	1 min 36 sec	1993	TV Show
8	Anthony Gatho	38 throws		Personal video
9	Bruce Tiemann	9 catches	1996	Personal video

Learning and improving

3 props O=1 !=6; !Doubles=10; !Triples=18

I guess you can already juggle three props with ease. General advise on throwing technique, correcting and improving patterns is given in part one (general advise and the lessons of topic one). Read it.
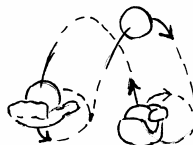
To do throw- or catch variations, learn to throw 4x2 (binary juggling). That is a slowing the pace of the cascade down, without throwing higher. You do that by throwing on the last possible moment. Everything will slow down, and lots of tricks will become possible.

4 props O=10 !=30, !Simples= 35, !Triples=18

With an even number of props, your hands can throw simultaneous or alternating and in the first option, you can throw a fountain or a cascade pattern.

With four props all three of the options are interesting to learn. Asynchronous fountain is easiest to learn, but in synchronous fountain it's easier to see your "faults", and therefore better to correct them to get a perfect pattern.

To learn four balls, you need to master two-in-one-hand in both hands (LP: 40, 441, 4440, [44][40]). Make large throwing circles, and don't juggle in the centre, but on the outside. Don't spin.

Once you can do that with both hands, you're ready for it. But to help you even more you can first train on patterns that help you to learn two in one hand while focussing on your other hand. Patterns as Magnets, Machine, The orbit... are all perfect for it. They are explained in chapter 5.

Once you get started, rhythm will be the hardest problem. If one hand throws higher than the other, the throws will gradually switch from asynchronous to synchronous. A difference in height is quite easy to see, but if the difference is only small, or if you switch because the holding time is longer, it's harder to notice what goes wrong. Eventually, you'll correct this on feeling, but at first it's quite hard. Normally it will always be the same hand that needs to throw higher. If you throw alternating, but one hand starts to throw just after the other, then that hand needs to throw a bit higher. To improve your pattern even more, learn to throw a straight up 5, which makes you switch into (or out of) synchronous throws. Then go for the other patterns explained in chapter 4.

If both hands throw synchronously, you can juggle a cascade pattern, every hand will stay catching one prop on every count. However there's one big problem, the props will collide in the middle unless you change the pattern a bit. The normal change is holding one hand a bit higher than the other hand. This makes the pattern look very ugly, but it's by far the easiest change. With clubs or rings, this change isn't possible. Look at the variations for other changes.

To juggle a descent **four club** pattern, you'll need descent fountain throws. Read the comment on throwing technique in part I (opening !!). Four clubs is easiest to learn in doubles. The learning patterns are similar to those with balls, although patterns as Magnets and so aren't important. Don't juggle column throws, learn it with fountain throws! Therefore always throw a little to the outside, and make large throwing circles.

Once you master it in doubles, go for simples. Height 4 in simples will be an unbearable skill as you progress. Again, don't throw column throws, but try fountain throws! Once you're used to throw height 4 in simple, a whole new world will open. With three clubs, all the 4x2 variations see later in this chapter will become possible for you.

5 Props O=35 !=55; !T=60; !S=70

The basic pattern with an odd number of balls is always the same. The hands throw alternating, to the other hand. Catches are made on the inside and throws on the outside. Therefore the right hand makes throwing circles clockwise.

For most jugglers five balls is their first real challenge. It takes a lot of training and patience to learn it. Therefore it can be useful to plan ahead. For instance, "I want to be ready for five balls before the holidays, so that I can train it during the holidays". As you become a better juggler, such plans will become more and more important. Training difficult patterns now and then, when you feel for it won't be enough anymore.

Some patterns out of chapter 4 help you to learn height five: The flash (55500) and The Snake (50505) with three props, and these four prop patterns: 552, 5551 and 55550 of which 552 is probably the most interesting.
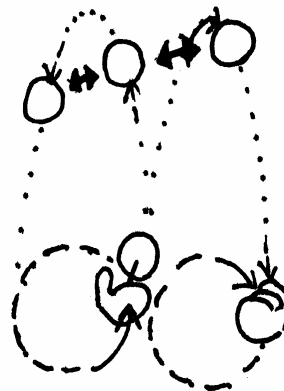
When are you ready to stop training these patterns and to begin five balls?
It's hard to tell. You can stop training them as soon as they become boring. (It's never good to do something you don't like.) If you can throw five balls something as 20 throws, after a few hours of training you are probably ready for it.
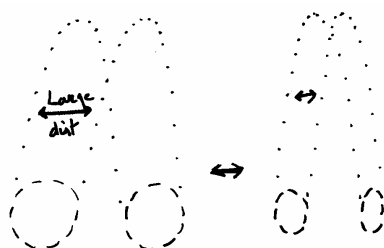
Problems arise when the arms make the throwing circles too small. Then the left-hand props fly too close to the right hand ones and collisions won't be far away. The more props you want to juggle the more important it will be to have nice large throwing circles. Throwing a bit higher can create the extra time needed to make such circles.

The larger the throwing circles, the lower the cross will be (the point were left hand props cross right hand ones). A cross on half height is about perfect, but opinions defer. However nobody defends a very high cross.

With **clubs**, you can choose the number of spins. If you have never trained on slow spin before, it can seem as if triple spin is easiest. I promise you, that if you train a bit on slow spin, doubles will become easier so that you will learn the pattern much faster.

It is of course possible that you want to do it in triples, but therefore you have to know what you chose. Try to see good jugglers doing both and decide for yourself. Once you have seen five in fast triples and five in slow doubles, you can decide for yourself what you want. And I'm almost sure what that your conclusion will be.

To throw five in doubles, there's actually no need to reduce the spin, only the over-spin given by the wrist. Therefore try, when juggling other patterns, to hold your wrist stiff as you throw. To catch the incoming clubs it will be necessary to bend the wrist a bit. Make sure it is already stretched again when the arm is at is lowest, so that it stays stretched when you throw it. The better the clubs are thrown, the less your wrist will have to bend to catch and the easier the slow spin throws will be.

It is a habit to throw slow spin, once you are used to it, you'll need to give your four clubs in doubles some extra spin, or throw it high. To train on slow spinning doubles, there are a lot of exercises possible. Four clubs in singles is a very good exercise, 53 and 552 are very good. 53, the half shower is easier because the doubles are always made with the same hand, and because a high three can slow the rhythm.
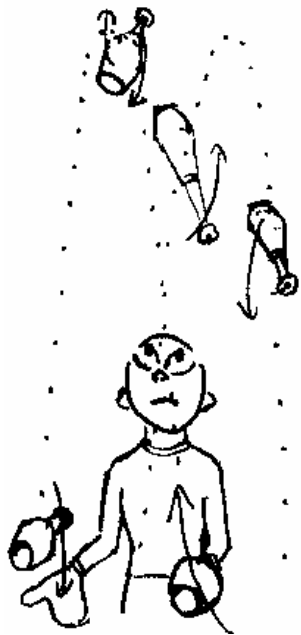
6 props O=70 !=∞

LP: 60, 64, 6662, 66661, 666660

The most important pattern to learn six props is of course three in one hand (60). Make your throwing circles as big as possible. Once you have a stable 60 in both hands, you can go for 6 props, but the other learning patterns will help too.

If you have rhythm problems; if you evolve to a Synch pattern, it's because one hand throws slower (or/and higher) than the other. You should feel what do, f not, the hand that gets forward needs to throw slower and higher. It is usually the bad hand. 64 is a very good pattern to learn keeping the rhythm. It's a shitty pattern, but it helps a lot.
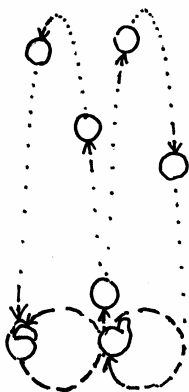
Once your six props gets better do the following things to improve it:
Always make your throwing circles as big as you can. Sometimes, your pattern runs smoothly for a while, then don't forget to keep the throwing circles big, that means, keep throwing from the centre, and towards the outside.
Second try to accept that you won't be able to correct a bad throw in just one or two throws. If a prop isn't thrown enough to the outside, you'll have to throw wider and wider again, throw by throw.
Further, site swaps and switches to synchronous fountain (to straight up 7's) will make you improve a lot too.

The synchronous basic pattern is a bit harder, because there is less space to throw. Therefore you can 't make you're throwing circles as big as in AS patterns, because you can't go over the middle

The synchronous cascade pattern is a bit easier than both fountain patterns, however it looks less beautiful, because one hand needs to throw from a bit higher, and/or a bit earlier. However, some jugglers aren't interested in how a pattern looks; if it's easier, it's better.

The more props are thrown, the more difference there is in difficulty between cascade and fountain patterns, and the less ugly the S cascade patterns are. Still, even for 8 balls I don't like it.
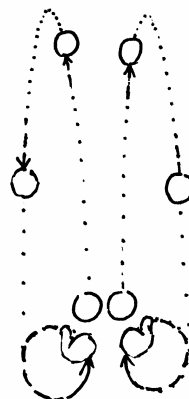
Six clubs is extremely hard to master. For every hundred jugglers that master five clubs, there won't be one that masters six. For most club jugglers, six clubs is a nice dream, but it stays a dream.

It is normally done in triples but it's also possible in doubles. **Dennis Homier** told me that it is a lot harder to do it in doubles.

To juggle three in one hand you need a perfect throwing technique. Read about it in the first part, and let good jugglers correct it on conventions. Otherwise, training will be a waste of time.

7 Props O=95 !=∞

Don't start too soon with seven balls, but train on height 7 as soon as possible. Ones you master five balls, you'll be able to throw a five ball flash (7777700), but this doesn't means you are ready to start juggling seven balls. These are some good learning patterns. Juggle them all continuously.:

7070707, 72727, 77722, 7777700, 771, 77772 and 777771.
Training five balls with very heavy balls can help.

Some people train a lot on height seven with one, two or three balls. I don't advise you to do so, although I know that a lot of very good jugglers do so.

The main problem is that you have to be realistic when doing this. Throwing one ball high up, so that it flies exactly where you want it to, isn't worth anything unless you have made the throw fast. It really isn't hard at all if you start the throw perfectly on the outside and if you take your time to make a nice throwing circle. But that's not what you have to do when juggling seven balls. If you juggle seven balls, you'll have to catch balls that don't drop where they should, and then make a very fast throwing circle to catch the next ball.

So if you train with very few balls, stay realistic, and throw fast.

8 props or more $0=\infty$

If you like to juggle (or flash) that many props, be aware that the difference in difficulty diminishes. If you can't juggle a completely fluent 4 ball fountain, the five ball cascade will still be too hard. However for such large numbers it isn't necessary to master the previous number to go to the next. Training on a nine ball flash will even help your seven ball cascade.

Variations

Throw and catch variations

In chapter I, I've explained the most common throw and catch variations, there all possible while juggling basic patterns. Generally they need more time to throw (or catch), so speed will be the key. Train to do them fast, and slow down (throw higher) your pattern. Read lesson 8 in part I about slowing the pace down (binary juggling).
 The more time it needs to do the variation, the higher the throws will need to be, and very important, the less time you may lose between throwing and catching.
Ones you can do the variation ones, the next goal should be, doing it on every throw. To get there you can always use the same sequence:

1) Try and train it with one prop. Be aware of the fact that you will have to do this while juggling, so train on speed.
2) Do the same with two props. Make a normal throw, then the variation.
3) Try the trick one time while juggling the normal pattern
4) Do it more frequently. This is a logic sequence:
   Six count: every time ball-1is in the right hand (if you juggle three props)
   Four count: one on two in the right hand. Then train the other hand.
   Three count: every time ball-1 is in a hand (if you juggle three props)
   Two count: every time with one hand
5) Train the variation continuously. it can help if you try variation a certain number of throws, and then continue the normal pattern. Try three throws, then five or seven Fe.

4 Two plane synchronous cascade

O=20

As said earlier, to avoid collisions in synchronous cascade patterns, the easiest way is to hold one hand a bit higher than the other, but that doens't look good. The other solution is throwing the one prop in front of the other prop
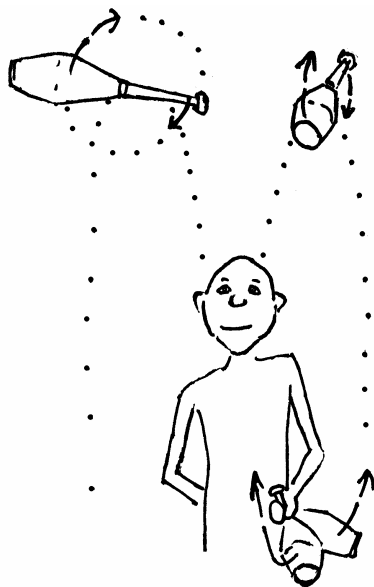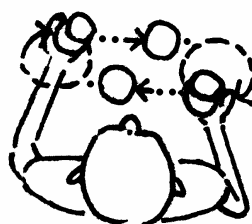
4 Scissors *O=40 !=50*

With clubs you can do that by throwing a backcross in one hand and a normal cascade with the other. In the classic Scissors, left and right throw backcrosses alternating.
It's also possible to throw backcrosses with both hands. *Jason Garfield* masters quite a few consecutive double scissors with six clubs.

4 Extreme height difference syncro cascade

Another solution. I saw *Gaspar …* once doing a fluent six ball cascade as this.

Pause variations

If you throw your basic pattern high, the throwing pace will get slow, so that (mini-) pauses will arise between the throws. Especially if you wait as long as possible to throw (so if you only enlarge the holding time, and not the catching time, or in other words if you juggle binary).

As the pause between catching and throwing is exactly when the other hand is throwing, the pause is synchronous with the throw of the other hand, and so you get in to synchronous patterns:

3 33 becomes [4x2][24x]
4 44 becomes [62][26]
5 55 becomes [8x2][28x]

As the needed height to get pauses in the basic patterns gets very high with four or more props, other patterns containing pauses are better to use.

With three props however, 4x2 is an extremely interesting pattern. Together with 423 and 42 4x2 it is the easiest pattern to do pause variations in. 423 is a bit easier, but has only one pause on two throws, while 4x2 has a pause on every throw. 42 4x2 is the most interesting pattern to do pause variations while juggling low (simples), or use consecutive pauses in one hand. If you want more pauses, you can also throw higher resulting in 522 and [6x2][22], patterns containing respectively 2 and 3 consecutive pauses.

3 4x2 Weave, chops, Drop swing,… !=18

These need little pauses and can therefore be learned in simples.

3 4x2 Flourish, Flip, Loop,… !=20

These pause uses need more time, and need therefore doubles to learn them (or even triples at first).

The 4x2 flip is an important trick to learn controlling the spin of clubs as you need to combine, a slow spin 4x with a fast spin 2. If you train on slow spin, it won't be that hard to master it a bit. But, whenever you get into trouble it's natural to go back into faster spin. By training slow spin while doing fast spin in the other hand this will get a lot better. If you really push it, it's possible to do simple 4's in flick too.

If you like this one, you can go further on it by throwing the doubles still higher, and trying something harder on the pause. It will make you end up in the pattern 6x4 20 *, discussed later.

Denis Pommier masters an astonishing fluent loop while throwing the 4's in simple helicopter throws, so that every club spins in the same plane.

3 4x2 Half flip !=25

Instead of doing doubles and simples it's possible to do one-and-a-half and half flip too. You can train again on slow spin, but fast spinning 4's are nice too.

If you like half flips, train on slow half 4's and fast half 2's. The secret to this variation is catching the 4's a bit high and flipping by moving your hand downwards fast. This variation has a really enjoyable mechanical rhythm.

Place of hands variations

I advise you very strongly to learn these variations. They aren't always as hard as they look, and they make a simple routine look as if you really master juggling.

Of course there are many more positions possible…

3 Crossed arms *O=7 !=15*

It' possible to juggle with crossed arms. Reverse cascade feels most natural, normal cascade feels awkward at first. To go into it, throw once very wide. As a variation, you can change the upper hand. To do so it's easier when you hold a ball (a mini-2), than when you don't (just after throwing, a mini-0).

Jay Giligan popularized the neat trick of changing the upper hand just after every throw. To get the needed empty hand time, you need to juggle ternary (see part I, lesson 8)

Juggling above the head *O=15 !=25*

Learn it ! With balls it's possible with 3, 4 or even 5. And *Christian ...* does it with 7. There are lots of variations possible as half pirouettes, backcrosses, flashes,...

There are a couple of jugglers on this world who can juggle three balls above the head, while looking at the audience, so in other words without seeing their balls. If you want to become one of them, *Christian* advised me to train five above the head first, and then to try not to look at your balls for longer and longer time while juggling three above the head.

With clubs, a nice variation is going into it out of reverse spin, because the clubs spin reverse too. Further search on half pirouettes, cartwheels, flats,...

3 Juggling behind the back, backthrows *O=70*

If a back-catch is followed by a back-throw, then you are juggling completely behind the back. It's easier to explain then to do, believe me. See more chapter 1.
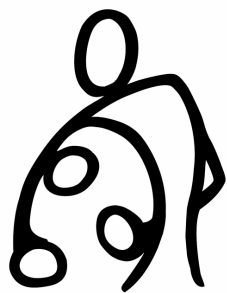
3 Juggling under an armpit *O=25*

Try to make exactly the same throws with both hands. Go low with the crossed arm to do so, and catch with the fingers.

To go into it, you can move with a ball in the hand, which is easiest, or move with an empty hand using the 4440 pattern, which is harder, but looks better.

It's very flashy to switch sides by throwing a ball behind your neck, with the "normal" arm, as *Stijn De Pourcq*, does very smoothly.

3 Juggling while laying *O=20 !=30*

Just try it a while, you'll see it's not that hard.

Some club jugglers manage to throw the clubs up, get on there back, catch the clubs up and continue juggling, doubles

should are enough to do so, if you get down fast.

Juggling around a shoulder
See chapter 8: windmill
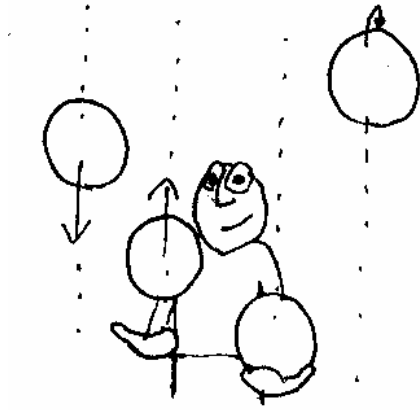
4 Walls *O=12 !=25*

If you're juggling an even number of props, you can juggle columns instead of fountain throws. If all the props fly in one plane, you get a wall effect.

It's possible to create a wave effect, or to juggle the wall with an odd number of props, but that's a lot more complex. They are explained in chapter 13 (Boston mess).

At the European convention of Grenoble I've seen **Toby Walker** doing a wall with six clubs in doubles. Astonishing !

Split ??, the wheel ??

3 Blind juggling *O=35 !=40*

It possible to juggle with closed eyes. Juggle very low and don't panic.

```
o .     o .     . o   o o   o o         . o     o .    o o   o o    o .    . o    o o    o o
o .     o .     o .   . o   . o         o o     . .    o o   o o    o .    o .    . o    o o
. .     o .     . .   o .   . .         . .     o o    . .   . .    o .    . .    o .    . .

. o     o .     o .    o .    o o       . o    . o             o .     o .           o o    o .    . o    . o    . o    o .     o .     . o
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o o     o .     o .           o .       o .    o .    o .    o o    o o          . o    o .    o o    o o    o .    . o    o .
o .     . o     o o           . .       o .    o .    . o    . o    o .          o o    . .    o o    o o    o .    o .    o o
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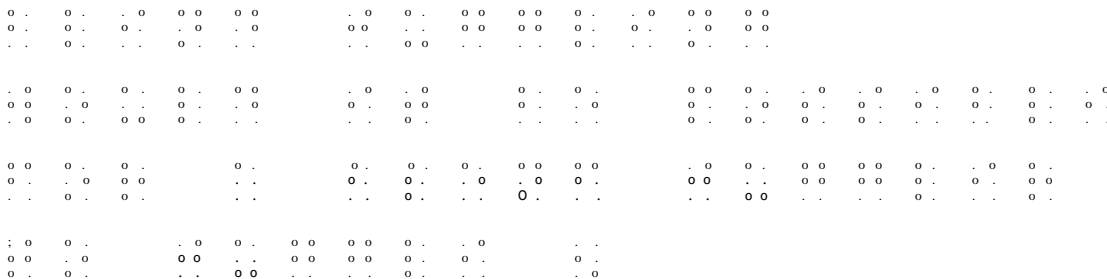
Pirouettes and stuff like that

To do a pirouette you need consecutive pauses or zero's, you get them by throwing all your props high. So, strictly seen, you don't juggle a basic pattern when doing a classic pirouette, but I do like them in this chapter.
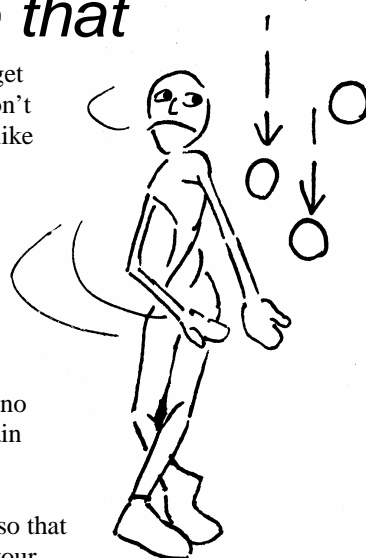
Full pirouettes

3 Classic full pirouette *O=40 !=60*

First, you must be able to do a pirouette without juggling. I'm no specialist on it (more the contrary actually) but I'll try to explain what others have told me (***Jay Giligan***). If you want to spin clockwise, do as I say, otherwise do the opposite.
Put your left foot forward and push it backwards on the floor, so that you spin on your right foot. Try to spin exactly one time, put your left foot on the floor to stop spinning.

It can help if you focus for a moment on one point (Fe: straight behind you). Don't try to focus on a point above you (to see the props).

Another specialist on the subject, ***Jesus Fournier*** stresses the fact that the speed of spinning comes out of your arms. They are wide before you spin, one arm goes behind your back and the other in front of you, both close to your body.
Further he says that it is important to see your objects as long as possible. So that means the head stays looking at the props while the body already starts spinning, and only starts spinning the head at the last possible moment.

To do a full pirouette while juggling, you need a double pause (one in the right and one in the left hand). As there are no pauses in basic patterns, you will need to throw some high throws to create them. It is possible to make a pirouette while holding a prop in each hand or while having two empty hands.

The pirouette with two props in the hands is made by throwing all the props except the two last ones to a height that is two higher than the one you're juggling. As it is two heights higher, crossed throws stay crossed.

Fe   3 props: 3333 522 333…
              5 props: 5555 77722 555…

The height of the high throws is quite relative and depends on the speed of your pirouette.

The empty handed pirouette is a lot harder, but a lot more beautiful too. To do it, throw all your props to a height two higher than the one you're juggling.

Fe: 3 props: 3333 55500 333…
             5 props: 5555 7777700 555…

With three **clubs** it's best to do the fives in triples, and slow spin is ten times easier then fast spin.
With five balls, some jugglers say that it's harder to throw three 7's holding two balls while spinning, than to throw four 7's holding one ball while spinning.

The most common mistake is made by trying to spin too early. Don't start spinning while throwing your last prop. The most important is that your high throws are very good. So, first

throw the high throws, and then after the last throw start to spin. You can even look a split second to your throws before you spin.

Other full pirouettes are explained lower.

3 Double pirouette *O=? !=?*

A double pirouette is nice, but what looks better and is easier is a double pirouette in which you make one or two catches after the first pirouette, and the other catches after the second pirouette. Therefore, with three props, throw:

33335570022333

Catching the two fives on the two pauses after the first pirouette, and the 7 after the second pirouette.

Half pirouettes

3 Classic half pirouettes *O=25 !=30*

A half pirouette is very, very much easier than a full pirouette. It's also more useful for a show. You change direction with it, what gives your routine some more dynamism. Half pirouettes are also interesting to learn backward passings.

Pirouettes are normally not done with an even number of props, but half pirouettes are.

Again, you'll need two pauses, one in the right hand, and one in the left hand. Therefore the patterns to make a half pirouette are just the same as for a full pirouette. As it takes less time to make a half pirouette, you can throw the high throws a bit less high.

However there is one big change. The hands change sides while turning.
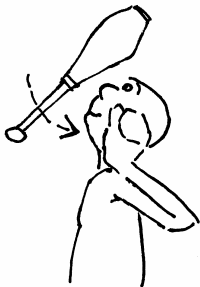
Therefore, throws to an odd height are thrown straight up and throws to an even height are crossed.

So, for a half pirouette with three props, you throw a 5 straight up and a little backwards. If it's a club, the spin direction will also turn (or that's how it feels), and therefore, you will catch reverse spinning clubs. That's no problem, cause that's easier. If it feels strange, you can train some normal passing with a friend. You have to make the same catches then.

You can throw the pattern straight up and turn under the props instead of throwing the props backwards.
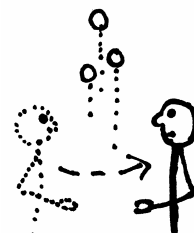
3 One-pause half pirouette *O=25 !=30*

It is possible to do a half pirouette on just one pause. That means that one hand hasn't got a pause at all. That hand throws the last prop high, and catches (while you start making the pirouette) a prop above the other shoulder.

Therefore you have to spin to the side were the first catch is made.

115
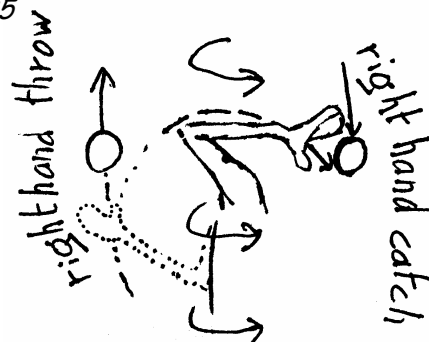
This method enables you to make a half pirouette with three props by throwing crossed (what is easier) and to a lower height.

Three props give: 33344403333…
The 4's are thrown crossed. I like this half pirouette much more than the two pause pirouette, and it helps to learn the two pause pirouette with four clubs (slow double 6's, easier than you would expect).

3 Double half-pirouette *O=30 !=40*

Catch two props after a half pirouette and one after a second half pirouette. You can use the one pause pirouette or the two pause pirouette. The two pause half pirouette is done with the same pattern as the double pirouette. The one pause pirouette can be done as this:
        3333446022333
With clubs that's possible in double-double-triple, but also in simple-simple-double.

Jason Garfield, one of the very best jugglers ever, does this: he juggles 5 clubs, throws a height 9, then two 4's backwards, makes a half pirouette, throws another two 4's, catches the first 4's, makes a half pirouette, catches the 4's, then the 9 and continues five clubs.
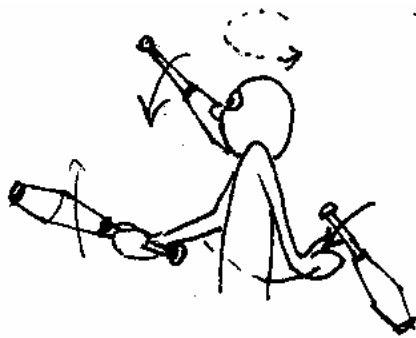
3 Backcatch half pirouette *O=25 !=30*

This is a nice half pirouette because you can do it really low and fast. It's both possible with balls and clubs.
Throw a fountain throw, a little higher and on the outside of the pattern. Immediately after doing so, do the same with your other hand, but do throw this ball backwards,. In the same move, turn, and make the backcatch.
You can do about the same, but replacing the backcatch with a neck catch.

Some other half pirouettes ideas

With three balls it nice to throw very low, tramline 5's over your shoulders.
Juggling above the head, before or after the pirouette is very nice with all props.
You can throw backcrosses or shoulder-throws instead of throwing backwards.
Rebound balls can be thrown backwards to the floor.
77722 with five balls isn't as hard as it looks, if you master the five ball cascade, go for it.
With four clubs I like this one very much: juggle four in simples and throw four crossed 6's in slow doubles. Turn and catch. To do this train on the one-pause half pirouette with 3 clubs.

Quarter pirouette

Quarter pirouettes are generally spoken very interesting because the audience gets to see different sides of the juggler. Some tricks look better frontal, others look better seen from the side.
A very important feature when juggling clubs and rings is to play with the spinning plane when doing quarter pirouettes. It's always very nice to keep the spinning plane, while changing the plane of your body. Examples are given below.

To do a quarter pirouette, you don't need pauses. The most important feature of a quarter pirouette is that it usually looks a lot better if you spin perfectly 90°.

3 Double spin quarter pirouette *!=10*

If you juggle **clubs**, throw a double and turn away from the hand you threw it with. Catch the club in the hand that you threw it with. You'll notice that the club now spins in your hand.

You can continue with dip are reverse dip variations to stress the different spinning plane.
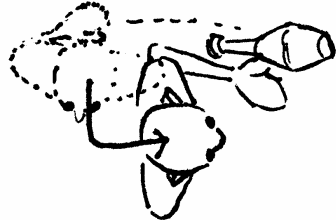
3 Backcross quarter pirouette *O=6 !=12*

When you throw a backcross, turn towards the hand that will catch it. This spin will make the catch easier. To improve it, try to turn perfectly 90 degrees.

4   Slow pirouette *O=33 !35*

Some patterns can be juggle them. The four be done with column every throw is made pattern will slowly

used to spin slowly, while you prop fountain for instance can throws (straight up). If then left (or right) of the catch, the turn.

Showers are ideal for that look at the

patterns to do slow pirouettes, next chapter.

Chapter three:

Showers and
Halfshowers

About showers and half-showers

In both there is one hand that throws high to the other that throws everything back low. Both in showers as half showers collisions are avoided by throwing to different heights. Therefore the large throwing-circles normally done to avoid collisions can be reduced a lot.

That enables you to speed up your throwing pace and therefore lower your heights. This is very important for showers.
S&hS are, if you ask me about the only patterns beautiful for their speed.

Showers

In showers one hand throws high to the other, and the other hand snaps back in the throwing hand.
Showers are mainly a ball thing. I've concentrated everything a bout clubs on the end of the shower part in Club-variations

Features

Heights

As mentioned higher, speed is an important ingredient in showers. This speed creates some difficulties and possibilities as you go further.
If speed goes up, the actual height of your juggling-heights is reduced (Read site swap theory !). This is called height reduction.
This table gives you an idea, but its quite relative (the last column consists of the equally high, normal heights).

Number of balls	Shower ASS	Shower S	Normal
2	3		Extreme low 3
3	5	4x	4 or 3
4	7	6x	5 (or 4)
5	9	8x	6 or 7
6	11	10x	8

The height reduction makes extreme heights as 9,11,13…possible.
Synchronous shower interpretation gives less height reduction. Therefore, to go in or out of a shower, synchronous patterns are easier.

Speed

If speed goes up and we want to switch into normal patterns we get problems. Solutions are logic, if you know why. They are given later.
Different speed also creates some new possibilities. What is possible if you juggle your shower twice as fast as your Mill's mess, and you switch between them ? More about this in the last lesson of part I.
Showers are, if you ask me about the only patterns beautiful for their speed. The faster the props follow each other, the more they draw an arc in the air. Especially with light emitting balls this gives a great effect.

Synchronous or not ?

This question is merely theoretical. It's possible to shower S, AS and between them. Normally it is juggled almost synchronous.
I will note showers AS because it's always done as that, and it's easier for me to write and for the most of you to understand. For some variations however, synchronous interpretation will be necessary.

Example:
The three ball shower can give
         5151 if it's written AS
         [4x2x][4x2x] If it's written S
But it always means the same; juggle more or less S.

Learning and improving a shower

Ones you get the hang of the three-ball shower, try to **improve** your shower **throwing technique**. Make sure that your throwing hand doesn't makes any circle.

This is something a lot of jugglers do. Of course it is possible to shower as this, but it is harder. I assume a four ball shower like this is almost as hard as a five ball shower with a good technique. This means it isn't impossible to see someone doing a six ball shower using this technique only, he could do better if he knew…
Not only this technique increases the speed, it also increases the precision. If you throw the ball by making a straight line with your hand, the ball flies exactly as you throw it. If however you make circles, you have to let the ball fly on the exact moment.

A second "error" you see jugglers frequently make is hopping up and down. Don't do it. Stand still. Hopping up and down is ugly, and it doesn't helps at all, in contrary, it makes things harder. Check if you stand still, ask friends. Please, don't hop.
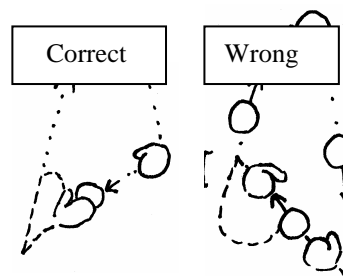
To learn showers with one ball **more**, its always good to train speed and split showers. Split showers can help to learn the required shower-height, but with lesser balls.
For example, 7131 learns 71.

Starting a shower with a lot of props can give some problems. Switching out of another pattern into a shower is always harder then a cold start. (If you really want to do it, half showers are easiest.) The first throws of a cold start are mostly less good than the following ones. The most frequent problem is this: the first props don't fly as wide as you want them to, therefore there is little space left to throw the next balls to the other hand. Collisions arise.
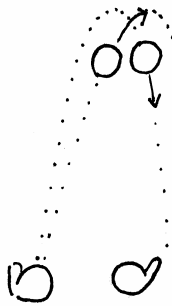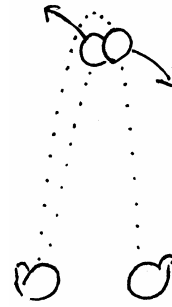
There are some ways to deal with that. First you can throw your first prop a bit higher than needed followed by a little pause in which you look how it flies. I don't advise this method. Especially with clubs it makes things harder than they are. If however you already have the habit to do this, then be aware of it. Starting by throwing balls straight up with the snapping hand is another strange habit. It's not easier, its bad and adding and making snake swans starts harder.
Better is to throw the first throws a bit wider than usual, but not too wide. If they fly a bit to thin, there is still enough place to throw the following ones.

Ones the shower runs smoothly, always continue throwing wide arcs, thin arcs will kill you, sooner or later. A wide shower looks a lot better too.

Simple showers

3 51, the three prop shower O=6 !=15, !soleil=30

Learning patterns (LP): 31, 4x2x 20, and 4x2 2x0
For most jugglers the two ball shower (31) is the first pattern they learned. Still it can be necessary to get some perfection in this pattern. Try to hold the hand that throws the snaps a little higher than the other hand, so that the throwing hand can catch with the palm of the hand facing up.
Check if you juggle it as this. If not, correct it.

Now try to create a hole in the pattern so that there can be a ball added.
First, wait to throw the snap until the high ball starts to descend again ([4x2][02x]).

Second, throw and snap on the same moment ([4x2x][4x0]). Make sure the snap draws a straight line in the air and that the other throw is high enough (higher than the three-ball cascade).

If you can do the previous exercises, take a third ball, hold two balls in the throwing hand, one in the other. Throw a ball out of the throwing hand to height 5 (it may be lower than a normal 5). When the first ball peaks, throw the two other balls as in the previous exercise. Continue throwing the snap and the height five on the same moment.

For comment on **club showers** look at the end of this chapter: club variations

4 71, Four prop shower O=20 !=40 !soleil=70

LP: Train split showers and speed with 3 (4) balls, and then try to do the shower with 4 (5) ballsl. That's all there is to tell you.
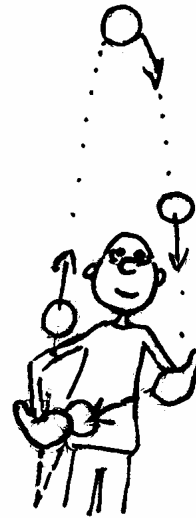
5 91, Five prop shower O=55 !=?

Same comment as on 71.

Split showers

In split showers, one hand always snaps and the other throws up to different heights, so that some balls jump the queue. In street shows you can always use that to make a joke about it.
If you like the following patterns, look for multiplex showers in chapter 6 and mix everything up.

3 7 1 3 1, the two headed 3 ball shower O=15 !=30

Ones you have a good three-ball shower, throw one ball extremely high then, very fast a low 3, and then continue the normal shower. Problems arise because the 1 3 1 isn't fast enough. There's no time to think! You need to know what you will need to do before you throw the seven. This is always so in site swap juggling; think before you juggle ! To learn the 7131, it can help if you throw an extremely high 7.
Ones this works, try to reduce the height seven (something as a meter above your head). Then go for the 7 1 7 1.
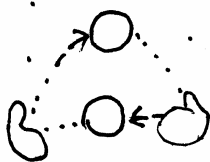
3 7 1 3 1 5 1, the three headed shower O=15 !=30

This pattern gives a nice effect if it is done continuously. What you see is that the balls fly higher and higher:

… 3 1 5 1 7 1 3 1 5 1 7 1…
(This effect is ten times better with four balls.)

3 7 1 7 1 1 1, consecutive 1's O=20 !=30

There are a lot of patterns possible with consecutive 1's. They are all so ugly that won't put the others in my book.

4 9 1 5 1, The two headed four ball shower O=35

Learn this one just as I have explained for the 7 1 3 1. Don't forget to juggle the 5 1 as low as possible. It is interesting to mix it up with multiplexes (more about this in chapter 10: multiplexes).
F.e.: (7,5) 1 2 1 (7,5) 1 2 1 (7,5) 1 9 1 5 1 9 1 5 1
Try to throw about to the same height with the multiplex 7 as with the 9.

4 9 1 5 1 7 1, The three ball shower O=36 headed 4

Creates the same effect as the 7 1 3 1 5 1. Once you master it fluently, attempt the 3 1 5 1 7 1 9 1 11 1, which gives a superb effect (it is a lot harder but its worth the effort).

4 11 1 5 1 5 1, Two balls jump the queue O=37

This isn't much harder to do just ones than the 9 1 5 1, just throw higher. Similar patterns are 13 1 5 1 5 1 5 1, 15 1… They are all fun to try, but ones you can throw them, they get boring fast. They are not really interesting to do consecutive. The only thing of any interest is:
        9 1 5 1 11 1 5 1 5 1 13 1 5 1 5 1 5 1 15 1 5 1…
And still it gets boring fast.

4 11 1 7 1 3 1, One ball jumps a ball that jumps the queue O=40

The three balls peak on the same moment what gives it a special rhythm. The balls go up fast, peak slow and go down fast. It is interesting to combine this pattern with 9 1 5 1 and multiplexes.

4 9 1 9 1 3 1, One ball jumps to other balls (O=40) and

4 11 1 11 1 3 1 3 1, Two balls jump to other balls O=45

Patterns that include two consecutive high throws are always hard to do. The second high throw always tends to fly lower than the first. Therefore, try to throw the second one higher, so that they go to the same height. Mostly it is worse if the second ball flies too low than if he flies too high.

122

4 11 1 5 1 9 1 3 1 *O=45*

This one is quite complex, and looks unstructured. You can ad a 71 so that you cover every "possible" height. Much better is the next pattern.

4 9 1 11 1 3 1 5 1 7 1 *O=60*

This is really the king of the four ball split showers. The image it creates is that the balls fly higher and higher and higher and higher.

> …3 1 5 1 7 1 9 1 11 1…

As you need to throw to five different heights you could lose the count. It helps lot if you know that the 11 is thrown just before the previous 11 is caught or that the 9 is always done with the same ball. (see →)

Five or more prop spilt showers *O=∞*

This gets hard, almost too hard. Therefore, I will only some up those patterns possible to do on the surface of the earth. Those who like to travel to the moon can search some more patterns up to height 19, 21…

5 11 1 7 1
5 13 1 7 1 7 1
5 13 1 9 1 5 1
5 11 1 11 1 5 1
5 11 1 13 1 5 1 7 1 9 1

> I have once seen an extra-terrestrial doing this pattern. He told me his name was *Ben Beaver* and that he was a human being. I still can't believe it.

6 13 1 9 1

Position of the hands

As always, this can create a lot of variations.

3 *Shooting*

Showering very wide can be nice especially with three balls. Fire your throws towards your snapping hand. Spinning towards the snap hand enlarges the pattern even more.

3 *Crossed arms* *O=15*

It's possible but quite uninteresting. Except if crossed and uncrossed throws alternate. But it is very difficult to get that regular.

Under the leg sucks

3 *Backcrosses and back-snaps* *O=15, O ultimate=55 !=30*

Both snap and throw are possible. Backcrosses however take more time than a normal throw. Therefore speed must go down a lot, or a pause must be created. Both methods destroy the image of the shower; one line of fast following props.
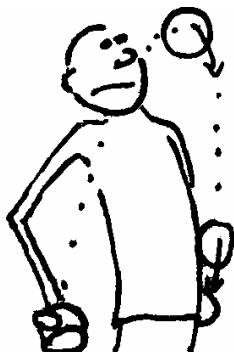
Backsnaps however can be very nice. They stress the big "circle" that all the balls follow. The circle now spins around the your body. It's best with three balls, cause otherwise the image gets destroyed by the height of the pattern, and of course it becomes too difficult.

To do it, mind these things:

Slow the backsnap down
Train above all on doing it synchronously
Make sure that your snap hand doesn't needs to
 move to catch.

Stefan Sing, a 3 ball half-god, masters a fast furious and fluent 7131 as this.

Statue of liberty

Although this seems to be a shower variation, it's actually a half shower variation. In other words: see half showers.

Movement: spinning shower

Both spinning and sideways move are possible. Moving towards your throwing hand can create the nice effect of vertical throws. Combination of those vertical throws and box patterns give lots of possibilities (chapter 5). Spinning is extremely interesting with clubs cause it gives them an in-hand spin.
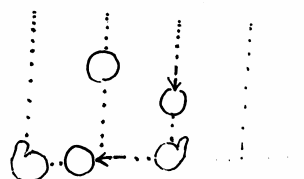
Club variations

As mentioned earlier, showers aren't much done with clubs. The main reason is that it's not beautiful. However some little changes can make them extremely beautiful.
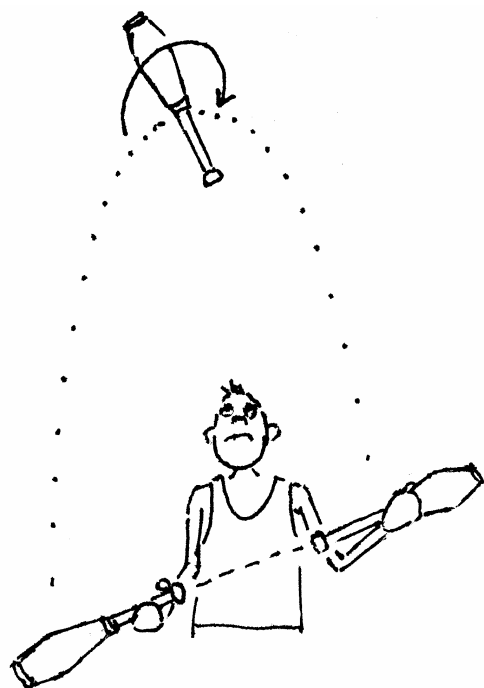
3 The three club open shower or soleil !=30, !simples=35
It is normally done in doubles (but simples are very nice too),
If a club spins to much or not enough, catch it the other way around, and correct it in the snap.
To perfection your shower, try not to catch reverse as you would normally do, but catch normal, in or over the middle of your club.
Then try to catch your club at the right moment, so that they make one line with the club in your throwing hand.
Then improve your snaps by holding them in the shoulder plane.
Ones you can do all that, you'll have a brilliant pattern. Interesting patterns to combine with are multiplex patterns and reverse dip patterns. If you want you can try all the patterns summed up higher for balls too.

4 The four club open shower !=70
This is a hard but very nice shower. It's normally done in triples.

Multiplex

Multiplex means throwing more than one prop out of the same hand in the same throw. There's a lot more about how in chapter 10.

In showers you can do a lot of multiplexes, but the most popular ones are those in which the throwing hand throws two odd heights.

Examples are:

3 515121(5,3)15151 *O= !=*
4 717121(7,5)121(7,5)… *O= !=*
5 717121(7,5)17121(7,5)171… *O= !=*

It's nice to switch into split showers. (7,5)121 into 9151 for instance.

Similar patterns and transitions

Transitions from one pattern into another pattern can give nice results. If you search such transitions yourself, always try to search for similarities of image. It gives a smooth change.

Switching out of basic patterns

To get out of or into a shower linking throws are needed (because showers are high state patterns). They are underscored.
Generally it is easy to go from a shower into any other pattern, cause a shower is a very high stated pattern. Linking throws will therefore always be pauses or low throws. Speed difference will be the main problem.
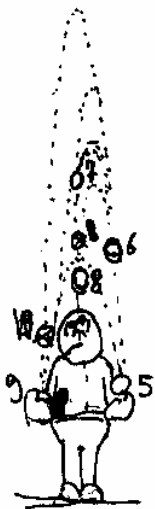
From AS basic patterns to showers

1) Gradually throwing higher and higher always works but it's hard cause it involves a lot of different heights. On the other hand it's beautiful cause all the balls follow the same line to go higher and higher.

Fe: 3 …3 3 3 4 5 1 5 1…5 1 5 1 2 3 3 …
     6 …6 6 6 7 8 9 10 11 1 11 1 … 11 1 2 3 4 5 6 6 …

If those heights are thrown at normal height, you end up in a very high shower. To avoid that you'll need to go, throw by throw, from normal height to shower heights.

Fe: 4   4 on normal height
            5 on height 4,5
          6 on height 5
            7 on height 5,5 which is +/- the normal shower height

Collisions are a harder problem. It's always hard to avoid collisions between a 5 followed by a 6 (7 followed by an 8…). This problem can be avoided by throwing a reverse 6 (on the outside) but that destroys the image. And ones you want to throw 5678 it won't help you any more. It's better to make large throwing circles.

There are a lot of other linking throws possible for showers. You can find them by using the state tables given in part I.
Some easy ones are:
        For even number of balls:
4   4 4 4 7 4 7 1 7 1…
6   6 6 6 11 6 11 6 11 1 11 1…

        For odd number of balls:
3   3 3 3 5 2 5 1 5 1…
5   5 5 5 9 5 9 2 9 1 9 1…

From synchronous basic patterns to S showers

Again there's a lot possible, but I'll only sum up the most important ones.

3   [2 4x][4x2][4x2x][4x2x]
                 Just continue throwing with the same hand and start snapping with the other

4   [4 4][4 4][6x4][6x2x][6x2x]
                 Problems arise on the 6x4. It's natural to throw the 4 too high. Fight it, it's the only solution.

5   The normal synchronous pattern is the half shower. That gives:
                 [6x4x][6x4x][8x4x][8x4x][8x2][8x2x][8x2x] or
                 [6x4x][6x4x][8x4x][8x4][8x2x][8x2x]

6   [6 6][6 6][10x6][10x6][10x2x][10x2x]

Other switches are often made out of boxes. That are patterns in which the hands throw and snap alternating (See more a bit further).

From ASS patterns to S showers

This looks quite complex, but it's usually the easiest switch. It's done to reduce the number of linking throws.

         Fe: With four balls, you switch to S by throwing a 5 straight up instead of crossing it as normally. This makes you end up in a synchronous pattern, then throw 6x2x and arrive in the shower. This means there's one linking throw less and collisions between a crossed 5 and the 6 have disappeared.

4   4 4 4 5 [6x2x][6x2x] instead of 4 4 4 5 6 7 1 7 1
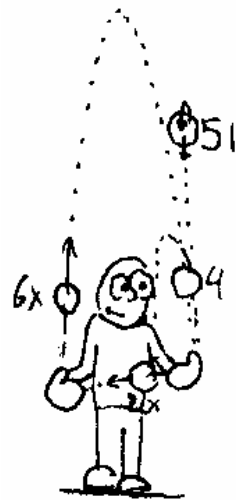
Switching sides

At any moment your snap hand can start throwing; leaving some pauses in your right hand after which it starts snapping.

To do so the first thing to learn is of course showering with the other hand. If you have problems with that, make sure that the snaps made horizontal, or a little downwards. It's natural to hold the hands at the same height than when you shower normal, but that makes your snaps go up a bit.
If it still doesn't works, don't give up. Showering on both sides is very useful to master. Boxes for example need it.

When switching side, it's hard to follow the throwing pace, as the hand that takes over throwing is normally your worst. Be aware of that. Throw a little slower and, more important, catch the first ball to be thrown up a little higher. That will create the needed time. It also helps to get in the fast pace if your throwing hand ends with a vertical throw.
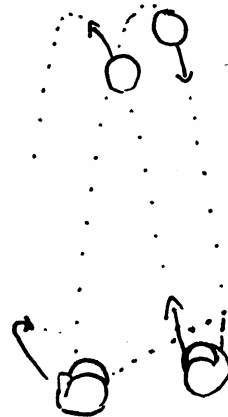
Once you've switched, try again to improve your shower throwing technique. This time it will be harder. Try to let your bad hand rule. He commands, the other hand has to follow.

Switching in a certain rhythm can be nice. F.e. if you switch just after the first snap, you end up in a pattern in which all the balls follow one line, except one ball that switches hands all the time.
Combinations with barrages (chapter 13) give nice results.

Lots of beautiful variations are possible on this theme. Here are some:

Switch to box (boxes see chapter 5)

With **three balls** it's not so hard. Switch sides by a vertical throw. Then do same on the other side, also changing the snapping hand. Continue this and you end up in the three ball box.

[4x2x][4x2x][42x][2x4][42x][2x4]…

It gets interesting if you mix everything up with the double box and a sideway moving shower. (I'm sure you'll find them yourself)

With **four balls** it gets a bit more complicated. Mostly it will need two vertical throws to get into a box.

f.e.: [6x2x][62x][62x][2x6][2x6][62x]62x]

(Of course you could see the two vertical end-throws as the first box-throws, but the feeling you get is otherwise. It only feels like a box after you change hands.)

Switching from the 9151 split shower to the double headed box (82x 42x), is nice. (actually, the double headed box is always nice.)

The X-box (6x2x 2x6x) requires this:

[6x2x][62x][6x2x][2x6x][6x2x]…

five balls will need three vertical throws.

Switch to barrages (barrages see chapter 8)

The three ball shower flows smoothly into Burke's barrage. Just stop snapping and catch the ball dropping towards your snapping hand with your throwing hand. Then start Burke's barrage.

The same is possible in the four (five) ball shower. You'll end up in the six (eight) count barrage. It is the easiest and most beautiful transition. If you really want to switch to 4 or 2 count barrages, this is required:

4 count [6x2x][62x][6x2x]
2 count [6x2x][62x][6x2]

Other switches or similar patterns

The are a lot of nice transitions possible. They always start with a pause in the throwing hand followed by one or more throws with the snapping hand. If there is no pause in the throwing hand, then there will be a zero.

3 Three balls, there's not much that I haven't mentioned yet. Don't search on patterns, there's so much with styles and position of the hands. Switches with some but not much interest are to 531, 52512 and 60 in the snapping hand.

With **four** or more **balls** there are still a lot of interesting patterns possible. Short patterns that include a 1 are mostly high state patterns, so you'll find more about them in that chapter

4 747141(4) and 74714147441 *o=40*

Linking throws 74 to get into the shower, 41 to get out of the shower. If you ad a 4,the pattern changes side.

4 5671234 *o=45*

Linking throws 56 to get into the shower and 23 to get out of the shower. Even harder ad more spectacular is 567801234. Both patterns are normally written as this: 1234567 and 012345678, cause that's what you see.

5 With **five balls** the linking throws to low state patterns are 567 to get in and 234 to get out as explained higher. High state patterns usually need less linking throws, but it gets extremely difficult to juggle high state patterns.

915 is a possible pattern, but linking throws are extremely difficult. 8181 are probably the easiest linking throws. Also possible are 2925, 2727 and 2367.

Half showers

In half showers, one hand throws high to the other hand, while the other hand throws low to the first hand.

Features

Half showers have a lot in common with showers. Collisions are again avoided by throwing on different heights. Therefore, throwing circles can be reduced again. Normally, the high throwing hand throws reverse, and the low throwing hand throws normal. (With clubs however, both hands throw normal)

They can be juggled ASS or S. Unlike showers, it is ugly if they are juggled in between.

3 3 prop half shower O=2 !=9

There's no real half shower with three props. The only thing possible is 3,5 2,5 which is juggled between S and ASS. With clubs, one hand can throw doubles while the other hand throws simples.

However there is one extremely nice variation for balls: **Statue of liberty.** See variations for more about it. The dropping ball is about height 2,5 cause the rhythm is much slower with three balls than with more (where it is height 3).

4 53, the four prop half shower O=20 !Triples=35 ,!Doubles:40

The four prop half shower is a very important pattern to master. You'll learn to throw height 5 and 3, patterns as 534, passing 7 or 8 props and actually every pattern including a low throw after a high one.

Learning patterns are: 5300, 5313, 531
To start the 53, hold two balls in each hand, and start with a 5. The 5 can be a reverse or a normal throw. I advise a reverse throw with balls or rings, and a normal throw with clubs.
It is possible to start out of the basic four ball pattern, but it is harder than a cold start.
Problems mostly arise because the 3 is thrown too high. Make sure he flies only half as high as a 4. The five must be at least three times higher. Too high 3's brake the rhythm. So lower them if the rhythm stinks.

With **clubs** it is easiest to throw the 5 as a triple and the 3 as a simple. 53 is often called triple-single by club jugglers. Ones you master triples the 53 will be a really slow pattern. It is important in club juggling to learn slow spinning doubles up to height 5. Not only to learn five clubs, but because you'll always need precise, slow spinning throws. The 53 in doubles is a ideal pattern to learn it.
To make them slow spinning, you'll need to reduce the over-spin; the spin created by your wrist. Try to throw only with your arm, without any wrist movement. Your doubles should at least be as high as 3 meter.
The rhythm in a 53 double spin won't be exactly asynchronous. Don't train on a low simple to get it asynchronous. Just accept it. It can give you the time needed to do a backcross…
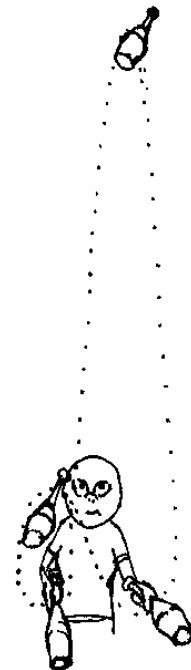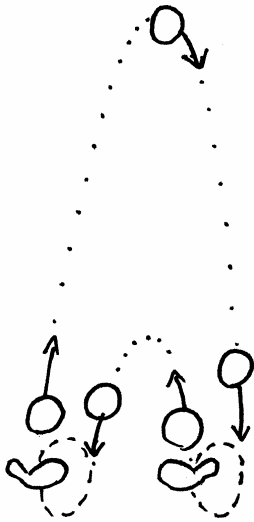
5 [6x4x]*, the S five prop half shower O=40 !=70

Learning patterns are [6x2x], [6x4x][42], [6x4][24x], [6x4x][6x4x][40], and [6x4][6x4x][0 4x]. They are all best to be juggled just ones (except the shower) out of the S four fountain. They are not so important. Ones you can do the five ball basic pattern, you should have the level to go for this one at ones (Although for balls).
Learning patterns for **clubs** are 53 in doubles and triples and 9 club passing in doubles.

Cold start is easiest. Take three props in one hand two in the other. Start with a 6x out of the hand that holds three props. Then throw [6x4x][6x4x]… It's also possible to start with a 6x4x. Therefore throw the 6x out of the hand that holds two balls.

For a warm start out of the basic cascade, juggle a thin five cascade and throw wide 6x's over it with one hand, continuing 5's with the other hand. When the first 6x drops the hand that throws has a half pause. After the half pause, start throwing 4x's, now S. The exit is similar. Throw 5's instead of 4x's until you have a half pause, then throw 5's instead of 6x's.That gives:

5 5 5 6x 5 6x 5 6x 1[6x4x][6x4x]…[6x4x][6x5x][6x5x][15x]5 5 5 …

Mark: The 1 as a half pause looks a bit strange, but it is correct. Always necessary to switch in or out of S patterns.

The **five club** half shower, is a quite new pattern. A couple of years ago nobody tried it. Nowadays, on conventions you see more and more jugglers attempting it.
Your simples should be so good that you don't have to think about them at all (even not if you have to do an other throw on the same moment with the other hand). Triple-single is easiest. With double-singles the clubs always smash together. Don't try to throw the triples on the outside. Throw wide simples, and throw the triples through them. If you're used to do passing, it will be a lot easier. Nine club passing in doubles will help you to learn to throw S simple and high throws (here doubles). On the other hand, 6x4x will help you to learn ten club passing.
Starting out of the five club cascade is extremely difficult.

73, the AS five ball half shower O=54 !=∞

There are so much problems involved in the 73 that it isn't done much.
With **balls**, the sevens are so high that its hard to see your 3's. Blind 3's (if you don't see them) are very hard. You can solve it by looking up until you can just see your 3's peaking. Then you normally don't see your 7's peak, but seeing them going up and down should do. It's possible to juggle it, but it feels like shit.
With **clubs**, you can always see your 3's, but they fly so high that the sevens have to be so extremely high…

With **balls**, half showers including a 3 are possible to juggle as a statue of liberty. It seems very hard, but it's doable. I would quote it a bit higher than the five ball shower, as hard as the six ball half shower 75.

6 75, the AS six prop half shower O=55 !=∞

The six ball half shower isn't harder than the basic pattern. It's up to you whether you want to juggle the basic pattern, the half shower or both. I like the basic pattern more cause it is symmetric. And it enlarges your throwing circles, what is more important to learn seven balls, than the bad height seven that you learn with this pattern. On the other hand, it is nice to master two patterns with six balls (or rings), so learn it too.

Learning patterns are not important. Throw everything up, and try to catch. This is the best way to learn half showers with a lot of balls. Of course you need to have the level. A stable five ball cascade, and a good 6x4x will help. 73 will help a lot, but you can learn 75 without it. Most important hint is that you need to throw wide 7's.

Clubs. This is brand new, but assumed to be easier then the basic pattern. I can't tell you much about it, only that it was done in triple-double when I saw it.
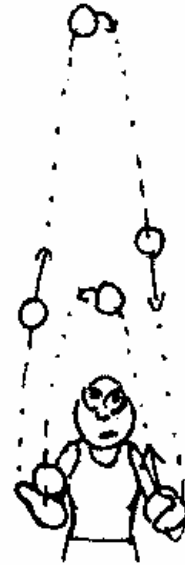
6 8x4x, the S six prop half shower O=75

This one is a lot harder. The 4x is still just visible if look to the peaking 8x's. The image it creates isn't worth the effort. The distance between the 8x and the 4x is too big. I guess it helps to learn 8x6x.

Seven and more

When the heights don't differ much, the half showers aren't much harder then the basic pattern. Learning patterns are of no importance, throwing and catching is the motto. I can't tell you much more. I can only sum up those I have seen: 8x6x, 95 and 97

Alan Kay is a half shower specialist. He throws on an astonishing speed to reduce the heights. It's crazy to see him adding balls to his half showers without seeing the height going up. He throws 97 on about the same height as his 75, by increasing the speed. It's nuts if you know that his 75 is lower than a normal height 6.

Variations

Balls

4 Reverse low, normal high O=35

Quite difficult. Tricky to do with four balls.
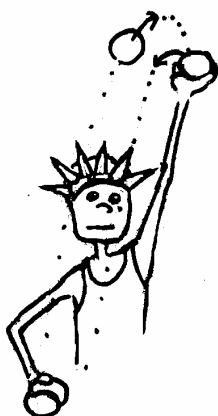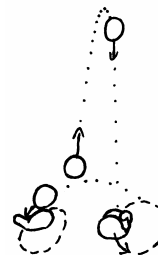
The statue of liberty O=10

This is possible with every half shower including a height 3. Hold your arms as in the figure. Make sure that the high arm is stretched completely and that you hold him a little backward. Hold one ball in the high arm, the others in the low arm. Start throwing out of the low arm, a little higher than normally. With three balls, that's a little higher than your high arm.

With four or five balls it is easier than you would expect. A cold start is easiest. A warm start is best out of the half shower or the shower. While juggling them, throw some high throws. Stretch your other arm in the little pause that is created.

Don't go slowly up with high arm, it's ugly and hard to do.

Clubs

3 Open half shower O=10

Reverse dip for the high throws and dip for the low throws give a very full impression.

Guy Waerenburgh masters this with four clubs in double reverse dip and simple dip, so fluently that it seems death easy. He stops with a half pirouette, backcatching the descending 5 with a handle catch

Backcrosses are possible to. It's good to learn five club backcrosses.
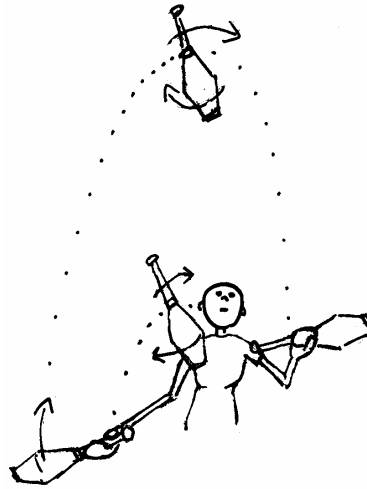
Similar patterns and transitions

There's not so much possible as with showers, and if it's possible it's mostly not interesting. Changing side's or split half showers for example are uninteresting.

It's possible to go slowly from one half shower into another. The throws between two half showers are between S and AS. Therefore I don't like it, unless it's done smoothly and with a lot of balls, cause then you look up, and you don't see the hands moving anymore.

Other related patterns of some interest are:

4 575151

Fun to do in a 53, cause one hand always throws 5's. It gives: 53 53 57 51 51 53 53…

4 7333

The same, but here it are the 3's that stays: 53 53 73 33 53 53 …

4 5344

The 4's are always the same balls, therefor there are two balls that do the half shower and there are two who go up and down (the 4's).

Chapter 4:

Asynchronous patterns

Intro

In AS patterns the hands throw alternating. The patterns are ordered first by number of props, then on height. Although there are a lot of patterns possible with one or two balls, I start with three balls. One and two ball juggling do not require explanation of patterns. It is purely combining all the throw, catch and manipulation possibilities I have explained earlier. The explanation on how to learn the trick gradually diminishes

As there are so much patterns possible, I will only discus those I consider most interesting. To give you an idea of the number of possible patterns with four I quote out of "Four ball juggling" of Martin Probert: "Up to height nine there are 29000 different asynchronous four ball patterns possible". All of them are possible to throw on different ways (reverse, backcrosses, Mill's Mess…). Most of them are complete crab. But still, that leaves us about 100 interesting four ball patterns. Three and five ball patterns leave us another hundred interesting patterns, again possible on different ways and with balls, rings or clubs.

Search other patterns yourself, using the theory about it in part I/theory/making patterns, making tricks and state tables.

Three props

With three props, there are some interesting patterns, but to become a good three ball or three club juggler, you shouldn't focus on throwing lots of patterns. Try to seek for non juggling movements and throw and catch variations. Pauses (height 2) can be used for arm or club movements. Movement of the body, walking, turning, pirouettes… are all much more important than the following naked patterns.

It's up to you to dress those patterns. I give you some classic variations here, but you will have to go further. Mark that, the variations are mostly not things to learn as soon as you can juggle the pattern, the variations are easily ten times as hard as the pattern.

3 42 (or 40), Two in one hand *O=1 !=15*
!Simples=18
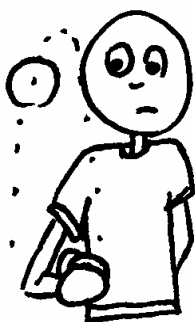
Learning it

Hold two balls in one hand. Throw one up some higher than your three ball height. Throw it from the inside to the outside. Throw your second ball just after it, so that you let it fly when the first one peaks. Make sure that you throw nice large throwing circles. Try to change into the cascade (33) and out of the cascade.

Variations O=1,3,2 !=13,20,15

Instead of throwing from inside to juggle reverse, cascade or in columns as With clubs, doubles are a bit easier, but unbearable later on, so learn it too. outside you can illustrated above. simples are
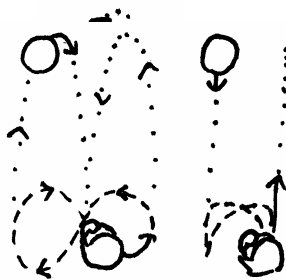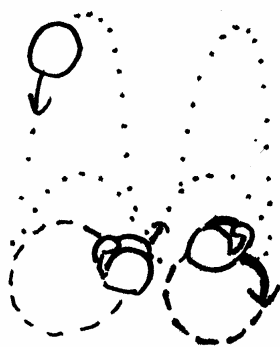
3 423 *O=2 !=10*

This is an very interesting pattern. Learn it, and learn some variations on it.

Learning it

After training both the three ball cascade and the two in one hand, learn to switch between them. To switch from two-in-one-hand to the cascade, throw a crossing ball, a little lower (3) and continue the cascade. It is important for the rhythm of the pattern that the height four (two-in-one-hand) is about double as high as the crossed height three..

Then try to switch a bit sooner. Throw only one height four (only ones two-in-one hand), continue the cascade and do the same on the other side. Ones this is mastered try to throw only one crossing ball before switching into height 4.

If you throw the 3's as high as the 4's, you end up in a synchronous pattern ([42][4x2]*).

Variations on the 2

423 is the easiest pattern to use pause variations. All the possibilities described in chapter 1 are possible to do in this pattern. With clubs throw the 4 as a double, if not you'll end up in [42][4x2]. Mark that you can do really hard variations if you throw the pattern really high, resulting in something similar to 62223 (or 64203 if you make a throw variation on the double pause). If you juggle this high 4 pattern binary, you'll end up in 62 22 24x, which gives you yet another pause more. This is especially interesting with clubs. Here I'll just explain some of the many possible variations.

3 Weave O=6 !=15

Perhaps the easiest pause use. While juggling the 423 try to feel the pause. Throw a little bit higher than usual. Just after you throw the 4, make a little circular movement (a weave) with the other hand. Make sure that the 3 stays low.

3 423 with a thrown 2 O=15   *!=25*

if you juggle the pattern high and slow, it's nice to throw the 2 as a very low throw. If you make the pattern even slower, it's possible to throw the 2 around the other arm.

With **clubs** throw the 4 as a double, and the 3 as a simple. As this is a very slow pattern, you can try the thrown 2 variation explained above. There are a lot of throw or catch variations possible.

3 High 423 club variations !=50

This is a trick of Joris … . If you juggle the 423 high (high double, high siple) and binary, you'll end up a [62][22][4x2]*, which has a triple-pause.
On those pauses he does the following swings: he start with a reverse drop swing (see chapter 1), swings on, lets the club swing over his shoulder and let it bump there against the shoulder. Swings it back (it now swings as a drop-swing). Lets it swing ones, and then go behind your shoulder to throw a cartwheel.
Once this works you can still add a drop swing on the pause in the other hand (the pause under the "6").

3 Variations on the throws

Instead of using the pauses, 423 is interesting to do variations on the 3 or 4 to. The 4 can be a really hard throw, as there's always a pause before and after.
As the length of the pattern is three (there are three numbers: 4,2 and 3) and as one of the heights involved is a 3, that 3 will always stay the same ball. This can be stressed. You can dio a Reverse 3 or a Duplex 3: 4 2(3;3), see more chapter 6.
Finally there's much possible with Mill's Mess (chapter 8).

3 441 *O=8 !=20*

Learning it

Learning patterns (LP): 11, 4400, and 41401. Then it is easiest to start out of 42 (two in one hand). Just after throwing, do the same on the other side, and snap a ball into your other hand, continue two in that other hand and try to get back by throwing 414 again. Try to switch as soon as possible, you'll end up in 441.
With **clubs** it is easiest to learn in doubles, but ones you can do it in simples you'll rarely do it in doubles.
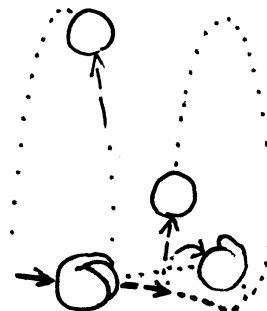
Variations and similar patterns

There aren't much easy variations possible, but there are easy similar patterns. For harder variations, try to search on the 1 and on the positions of the throws and catches (as Mill's mess stuff). Further the 4's can be thrown as cartwheels, backcrosses, reverse dip,... If you want to throw such variations, it's always easiest on the second 4 (because [24][42x]*, it's stabilisation pattern shows that you can create a little pause before that throw

3 4413, 441522 and 44142 O=8 !=20

is nice when the 4's are juggled on the outside.
441522 is nice when the 4's are juggled on the inside and the 5 goes around.
44142 can be juggled in columns. The first two 4's are thrown on the inside. The one goes from the outside to the outside, the last 4 on the outside.
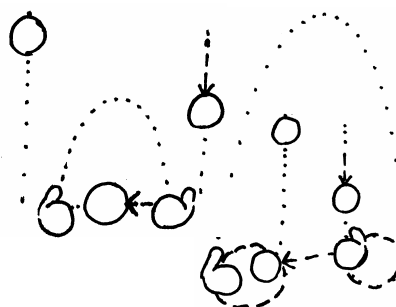
3 441 penguin variation O=25

Throw the first 4 on the outside, column, and catch it penguin. Second 4 column in the center. This variation isn't really hard, and look's better than you would expect.

3 441 high snap O=40

Throw the second 4 crossed and high, catch when it peaks on the other side and snap downwards. Throw under your arm with the other arm.
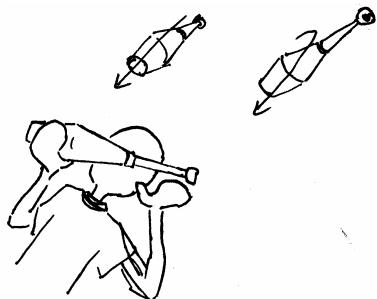
Luke Wilson throws a 441 club variation in which he catches the first 4 (one and a half spin) higher than usual on the "wrong side", and then passes it to the other hand (height 1) behind the neck. It's really nice to see.

Manu Laude does the snap as a flip-roll around the belly (chapter I).

3 **4440(3)** *O=9 !=16*

Learning:

4440 is a typical pattern to do just ones. If you do it continuously, it's ugly. To do just ones, it's easy. Throw the cascade (33). Then throw fountain throws instead of cascade throws, about twice as high as your cascade throws (height 4). Catch and continue the cascade.
With **clubs** throw doubles or simples. Most variations look much better in simples.

Variations

3 It is possible to do a half pirouette. See chapter 2
3 The second 4 can be a very hard throw variation because after that throw the hand rests empty (0). Throwing around the corpse, shoulder throw, Gilli,... are all possible, and a lot easier than in other patterns.

3 The catch after the 0 (with the same hand), can also be a hard one, as catching under the other armpit, neck-catch,...

3 522 O=2 !=15

522 is nothing more than a very high cascade. Just do it. Throw about four times as high as a 3. With clubs throw triples or high doubles.

Variations

3 52233 and 52242 O=3 !=16
In this similar pattern the 5 always stays the same ball as pattern is length five. The 5 thrown reverse could stress that.
In 52242 you get three consecutive pauses.

3 522 weave O=20 !=25
Make an orbit with your hands on every pause. So two orbits for one throw.
There's a lot possible with the double pause in the 522 pattern but first learn the variations on the similar pattern with one pause: [4x2][24x] (chapter 5).
Then, try first to feel the two pauses, first in the hand that didn't threw and then in the hand that just threw. You can do a lot with two pauses, but first try to do something you normally do on a simple pause but now twice, as here.

3 Two flourishes !=25
First train one flourish, see chapter 5. If you throw the 522 only ones, you have two pauses, first in the hand that didn't threw high then in the hand that threw high. So with one high throw (a high double) you can do two flourishes.

3 Double flourish !=40
Train first on the two flourishes and master the normal flourish ([4x2][24x]) before you try this one. Then train a double flourish with one hand (see chapter three).
The double flourish looks exaggerated. It's trying too hard to do a nice trick, but in a street show, or with torches it can look good.

Ones you have the level, you can try to do more complex stuff. One of them is:

3 "The shoulder-drop" O=30 !=40
During the first pause bring your hand to and over your shoulder. During the second pause, let the prop drop and catch it.
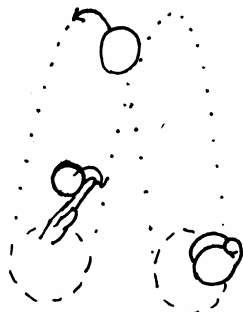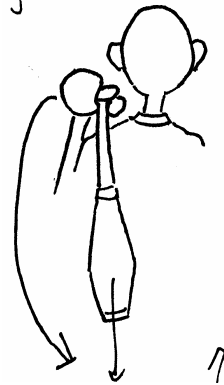
3 522 or 52242 hand flip O=50
This is a very hard one, but it's worth the effort. First learn the "hand flip", explained in chapter 1.

Then do the hand flip on the double pause in 522. You will need very fluent hand flips and high 5's, as there is no pause between the two flips, therefore 52242 can be better.

3 52512 O=8 !=30

Learning patterns are 522 and 51, 50505 helps to. It helps if you know that the two fives are always thrown with the same balls, so there are two balls that arc two the

other hand, then that hand snaps a ball and throws the incoming balls back to the first hand.

This becomes an interesting pattern if the pauses are used creatively. There are two consecutive pauses in one hand, followed by a snap. The are hundreds of things possible on a double pause and snap. I'll give three examples, but search others yourself if you like this pattern.

Once you master the pattern, you'll see that the 5's may be thrown very low or very high, the pattern will keep working, but the pauses will be shorter or longer. This is important if you search variations.

Variations

3 72313   O=35 !=45

This is a similar pattern, however now, the second throw jump's the queue.
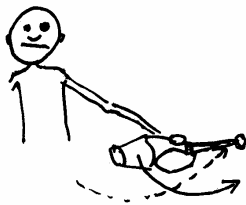
3 Loop variation !=40

The club is snapped normal, but caught reverse as in the illustration. The reverse held club is then twisted in the "helicopter plane", and the twisting movement is continued by doing a finger loop.

3 Backdrop variation

On the first pause, move your hand up. On the second put your hand behind your head. On the snap, let the prop drop behind the back and catch it with the other hand. Then, do the same on the other side.

3 The bridge (balls)

This is a contact-ball variation on the 52512 pattern. Its explained in chapter 1 (Rolls, the bridge).

3 531 *O=15 !Triples=30, !Doubles=35*

Learning patterns are: 522, 5300, 531(3), 5313.

5300: Hold one prop in each hand. Throw a high cascade throw (5). Throw a low cascade throw (3). Nothing in the hands. Catch the low ball. Catch the high ball. So, first the low ball than the high ball.

Then try 531 just ones. Throw a high cascade throw (5). Throw a low cascade throw (3) with the other hand. Snap with the first hand (1). Catch them all three. Don't wait, don't think before snapping. You have to do it directly after the 53.

Try then to do that while juggling the three ball cascade. It helps if you do the 5 extremely high. Continue the cascade and try again. Throw the cascade less long before trying again.

5313 is easier than 531 cause it's always the same hand that has to throw the 5. Finally, go for the 531.

For **Clubs**, the five is easiest in triples. Ones it works you can train on a 5 in double, but it's not really better.

Variations

There is not so much easy stuff to do with the 531, but the elegance of the naked pattern can do. Mark that the 3 is always thrown with the same ball.

3 531 soleil: clubs in shoulder plane !=45
Reverse dip for the five, dip for the 3 and dip snap are very beautiful.

3 Backcrosses
Backcrosses are often done with clubs in this pattern. The 5, 3, 1 or all together. It is easier than it seems to do just ones, it is harder than it seems to do it continuously.

Denis Pommier does them all three backcrossed, continuous, perfect.

Matthias Vermael throws the 5 in the triple, the 3 as a trebla and the one as a backsnap, really flashy.

3 Reversed 31 O=20
Catch the 5 a little higher than usual. Before snapping it, move your arm a bit upwards to the other side. Now throw the 3 with the other hand, under the high arm, and snap the 1 downwards.

3 Clawing O=25
It's possible to throw the 3 as high as the five, and then to catch it by clawing it out of the air while it is just over it's highest point. By clawing it so high it will only stay as long in the air as a high 3. It looks best when the 3 and the 5 are thrown to exact the same height. Therefore, throw the 5 low, and juggle very fast. To train it, throw the 3 only a bit higher than a normal 3.

3 Look at Mill's mess and Boston mess for **more ball variations**.

3 5511 O=12 !=30
Patterns with two consecutive 1's are usually stupid. Therefore, this is the only pattern with two consecutive 1's in the book.

Variations

If you ad a 3 it becomes a little more interesting (cause it changes hands). But it's stays ugly. Now matter how ugly a pattern is, it's always possible to make something nice with it. I've seen *Jay Gilligan* juggling a really nice club variation on it. He did the two 5's as triple backcrosses, then while making a half pirouette, snapping behind the back, and then normal, continuing this sequence.


3 55500 Three ball flash O=25 !=35

Learning it

Throw three consecutive high throws (555).Throw them fast so that you have to wait with empty hands until they come down again (00). Then continue the cascade, or go on with the 55500.
The flash is a very good pattern to learn the five ball cascade if you throw it continuously. But don't be naïve, it takes a lot more to juggle five balls then to do the three ball flash !! The three ball snake (50505) is also a very good pattern to train for five balls (see high state patterns).

Pirouette or **half pirouette** see chapter 2.
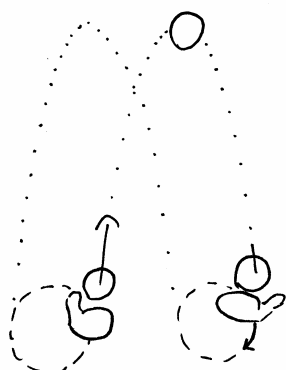
3 55050 the snake (50505)

O=20 !=40

This pattern is called the snake because all the props follow one line (50505). To create that snake image it is important that you throw the pattern very smoothly. It is a very good pattern to learn the 5 ball cascade. Snakes are possible with any number of props. The two ball snake (303) learns the three ball cascade, the 4 ball snake (7070707) learns the Seven prop cascade.
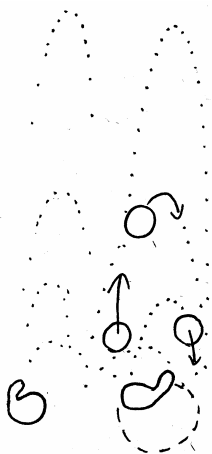
Learning it

LP: 55500, 51, 51512. Linking throws (LT): 4

It's natural to regard the pattern as 50505. Then a cold start is made with three balls in the starting hand. Throw the props high and slow so that your other hand (the bad one) can follow the pace. The most important thing to improve your snake is that you have to be ready to catch and throw with the hand that is doing nothing. It has to catch a split after the last ball was thrown. When the first ball is caught, it must go down to throw immediately, so it must already be moving downwards before the catch, so before the last throw with the other hand. So, while the last throw is made you should already focus on the next catch in the other hand.

3 45123 (12345) *O*=15 !=30 and 4560123 (0123456)

O=30 !=45

Both patterns give the same impression: the balls fly higher and higher (0123456 0123456). Both patterns are good to learn all the common heights for three balls.

Learning it

LP: 4512(3) and 45612(3)

It helps if the highest throw is done too high. It gives a longer pause after the 1 (more or less 4 5 8 1 2 2 2 3). Ones this works lower it again to the right height.

To avoid collisions a 6 thrown after a 5 is sometimes thrown on the outside. Don't do that here. It would destroy the image. It is better to start the low throws with the hands very close to each other. That makes the even heights easier, and it increases the image of the balls flying higher and higher because the three is thrown almost vertical, so just like the four, the five and six.

Variations

The 45 are the linking throws to go into the shower and the three in one hand. Therefore, combination with those patterns are natural.

Fe: …45601234560606060…
          …4512345151…
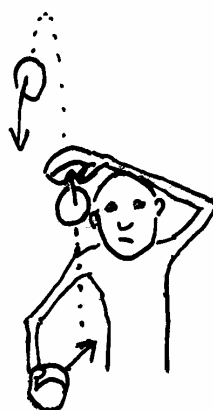
3 6420(3) *O=15 !=25*

There isn't much interesting with three ball ASS patterns that goes higher than height 5. This is an exception. The hand that throws the 4 has a zero after it. Therefore the four can be a very hard throw variation, and that makes this a really important pattern.

Mintam Kaplan does this: 64203 with the 4 being thrown behind the back, under the other armpit and caught behind the neck. And as always, as perfect as can be.

3 60 three in one hand *O=30 !=100*

This is an important pattern if you want to juggle patterns with a lot of props later. If you're only interested in three prop patterns it isn't important to master this pattern.
The three in one hand learns you to throw to height 6, and to make big throwing circles.

Learning it:

LM5, LP: 40, 602060, 406020. Linking throws (LT): 45 or 63.
406020 is throwing two in one hand, then throwing high, low, high… Make it hard for yourself by throwing very low 4's so that you have little time to throw the 6.
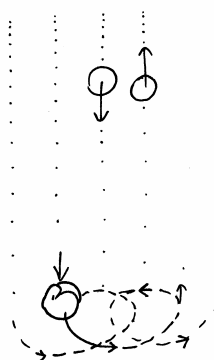
Variations and similar

3 Reverse, Columns and Cascade, Reverse cascade.
To start, cascade is easiest. Once you have learned to throw big throwing circles, the normal fountain throw will become easier. The normal fountain throw is what you have to learn to do 6 balls and most of the height 6 site swaps.
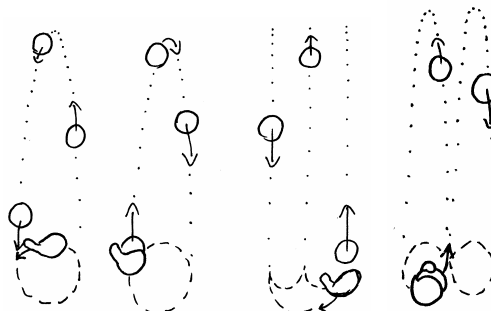
patterns

To juggle 60 in columns it helps if the balls are thrown a little higher than normal, leaving a little more time between the last throw and the first one.

3 Spinning

If you throw column throws, and keep throwing on the same side you have to move sideways or spin.
Spinning gives a beautiful dynamism to this pattern if it is done regular. There aren't much patterns of this difficulty possible to move with. Therefore, in a four ball show (62) for example this can be a good trick to get some movement in it.
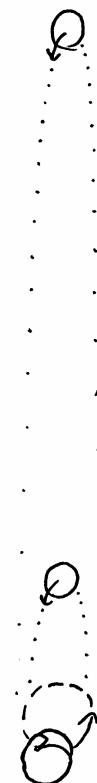
3 Changing hands (60)5050560(60) or [60][6x0][6x0][6x0][06] *O=35*

This is the easiest way to change hands. Throw to the other hand on height 5 or 6x. Actually you can throw what ever you want to the other hand, as long as the two last heights are the same and not smaller than the first height. So 30525 is possible too, but three 5's or three 6x's are best. (Three 1's are still a bit better if you ask me.)

141

3 changing hands 6161601 and 1234560 *O=40*

This are both nice tricks to do continuously to.

To learn 6161601, it's best to start out of three in your bad hand, switching to your good hand. If you switch from your good hand to your less good hand, juggle high and slow so that your less good hand can follow the pace.

If you want to do this pattern out of a low state pattern, you'll need a 4 as linking throw. 441 is nice:…441441 4 6161601…

3 8040, double heade three-in-one hand *O=45*

One ball stays low, and the other balls fly around it. This is a nice pattern, and it isn't as hard as it looks. If it works once, it will always work.

Learning it:

LP: 804000 !!! Throw one prop very high, then throw one very low. The most important thing is that you throw the 4 very low, and very fast after the 8. Don't think after throwing the 8. Throw immediately.

Variations and similar patterns:

3 Columns *O=40*

This variation, is easier than the normal pattern, cause if yoiu throw the 8's on the outside, and the 4 between them, your hand doesn't needs much time to move, as it always throws left, middle, right, middle, left, middle right, middle….

3 10 0 4 0 4 0, 10 0 6 0 2 0 *O=60*

This is a lot harder already. Height 10 is an extreme height. It are good patterns to learn 10 0 6 0.

Some other three ball site swaps of interest are:

3 Low state: **45141, 63141, 6316131, 4516131, 7330730370330 and 71401714700**

3 High state (linking throws between brackets): (**4)450(2), (4)612(2), (4)615150(2), (46)801(40)**

Four props

There are a lot site swap possibilities with three balls, but as I've said higher, it can be better to search variations in another dimension. You can do what ever you want with a three ball cascade ones you become an experienced juggler. Juggling it reversed, above the head, as a statue of liberty,… is all possible without any site swap is needed. Creating pauses is as easy as it can get. Just juggle two in one hand ones or juggle a bit higher ([4x2][24x]). Again no site swap needed.

With four balls that all changes dramatically. Throwing variations as backcrosses, cartwheels, (reverse-)dip,… becomes very hard. Juggling them fluent continuously gets exceedingly hard. Second, creating pauses isn't that simple anymore. Juggling three in one hand and doing something with the other hand? And how to get in three in one hand out of the four ball fountain ?
Site swap theory gives answers to those questions. As it all gets more complicated it's hard to find those patterns without site swap. Site swap gives many doable and beautiful patterns and is really on its best with four balls. Ones you become better you can try to throw harder and harder patterns or search for crazier and crazier variations on easier four ball patterns. Some complex variations are explained in chapter 6 and 8.

4 552(4), The four ball exchange

O=12 !=35

Once you master the four ball fountain it is natural to try to cross two balls. To do so it is easiest to throw two 5's followed by a pause. LM4, LP: 522, 44, 55000 (I hope you understand the meaning of those patterns by now.)

Throw the fives at least twice as high as your 4's. You may throw them too high, but they have to be thrown to the same height. Otherwise you end up in a S pattern. Once you master this pattern, try to feel the pause, that's important if you want to use that pause.

For **clubs** throw triples if you're juggling four in doubles, throw doubles if you're throwing simples. It takes a little more time to throw a high throw than a low throw, therefore, if you juggle four in simples you will have to higher your simples a bit to have enough time to throw a high double.
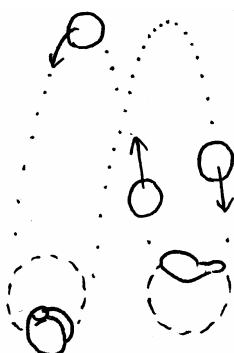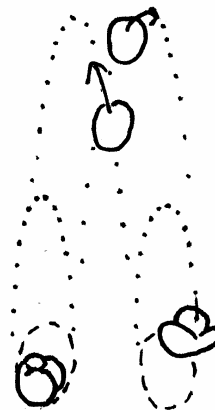
4 552 *O*=15 !=36

The 552 is an important pattern not only to learn the five ball cascade but also because it is the easiest four prop pattern with a pause.
LM4, LP: 552(4)
A cold start is probably easier. Hold two balls in each hand and throw one five with one hand. Then throw twice out of the other hand, then twice out of the first hand again twice out of… So it actually feels as if you throw the pattern 525, but patterns are always written with the high throws first (lowest state), so we write 552.

It is important to do large throwing circles. The first (525) five can be thrown a bid wide to enlarge the centre space. The most important thing to do is to throw the 5's to the same height.

Variations

4 552 Weave *O=20 !=40*

In a weave the pauses are used to make an orbit. The orbit is normally done in the direction of the throwing circles.

LM8, LP: 4x2 weave (see chapter 4), 522 weave

It's easier to start juggling a normal 552 and then to start doing the weave. It can be hard to throw both 5's to the same height because the 5 throw just after an orbit in that hand, will tend to be thrown higher. Be aware of that.

4 552 Flourish !=45

There are other possibilities with clubs, but this is the most common move. Throw the 5's in doubles, triples are too high. The clubs needs to stay quite low, where the flourishes are made. Learning patterns are the 4x2 flourish in doubles and in simples, the 522 flourish can help too and of course the 552 normal. It is a good exercise to improve your slow doubles (to do five clubs).

4 55244 and 55253 *O=20 !=45*

This are two patterns made by a combination of two patterns. 552 and 44 or 53. These combinations bring the pattern up to length five so that the 5's stay the same props.

LM3

4 5551

LM4, LP: 552, 55500, 55550, 51, (441)

While juggling four balls, throw three times a high crossed throw (5). Then snap a ball. Continue the four ball fountain. If this works try to do 5551 continuously. With clubs throw triples or doubles (it's not really useful with clubs).

Variations and similar patterns

4 55514 *O=30 !=50*

This pattern feels much better to do because it is odd, and therefor symmetric.

LM3. LP: 5551444.

4 64514 and 56414 *O=35 !=60*

LM4, LP: 5551, (642), 64500, 56400.

Try it, you'll see, just throw a 64 instead of 55.

I like them more than 55514. The 64514 is god to learn the 645 and is very doable in columns and mills mess c-form.

4 7531, 7441 and 6631 *O=40,35,40*

753, 744 or 663 instead of 555. See more lower.

4 55550(4) The double exchange *O=16 !=40*

All four props are crossed. It's not much harder then the two ball exchange. It is a pattern to do just ones, not continuously. If you do it continuously, it's ugly, but it is a very good exercise for five props.

LM4, LP: 552, (5551), 55500

Throw the two ball exchange twice. Cross two balls, and then again two balls. Instead of a 2 you get a 0.

With **clubs**, simple fountain gives double 5's, double 4's need triple 5's.

4 53(4) _O=20 !=35_

This is a very important pattern in four prop juggling. A high throw (5) is followed by a low throw (3). It will take some time to do it, but it's so important. The fault is always the same, the low throw is thrown too high.

LM4, LP: 5300, 531, 5340, (504), 552(4)
You should already master 531 and 552(4).
If everything works, throw a four ball fountain, and try a 53. The 5 can be thrown normal or reversed to avoid collisions. Don't wait after the 5, throw the 3 as fast as possible after the 5. It is natural to throw the 3 too high. Therefore, throw the fountain higher than usual, throw the 5 very high, and try to throw the 3 as low as possible. There's a big chance that the 3 is still too high. If all the heights are thrown right, the rhythm of the fountain after it should be perfectly ASS. As long as you have to correct the rhythm, your heights are incorrect. It's up to you to correct them, but normally it is the 3 that is thrown too high.
For **clubs** it's easiest to do the 53 in triple-simple, however double-simple is also possible.
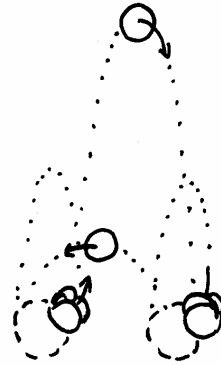
Once you can do one 53, you can try to repeat the 53 as fast as possible. That gives you the following patterns:

4 53 the half shower _O=20 !=35_

See chapter 3

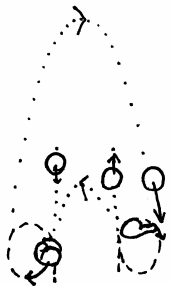## 4 53444 Four ball tennis _O=23 !=40_

What you see is a four ball fountain in which one ball arcs over the pattern
LM3, patterns 53(4) and 44
The pattern is length five and therefor the five stays the same ball.
You can stress that by throwing a reverse 5.
Mark: 53534 gives the same image, but now there are two balls arcing.

4 5344 _O=22 !=38_

Two balls fly around two others.
LM3, patterns 53(4) and 44.
As it is an even pattern, it doesn't changes hands, and is therefor easier. The fours are always thrown with the same balls. The two other balls fly around them if the 5 is thrown reversed.
4's in columns make it still better.

4 534 Popcorn *O=25 !=40*

The pattern is called popcorn because all the balls pop up to different heights and directions. Therefore it is a very nice pattern. Patterns of length three, with three different heights are always beautiful (531, 723, 741, 753, …).

LM4, LP: 531, 53(4), 53444, 5344, 53
It can be difficult to know when to throw the next 5 if you have first trained 53444 and 5344. Consider that the five is always thrown when the hand has to catch an incoming five. To avoid collisions, throw a wide 5.
Ones you can do the 534 a couple of times, you'll master it in now time. That's because 534 is a very stable pattern (see stabilisation theory, in the begining of this chapter). To increase the stability even more, throw high 5's, then almost every fault in height can be corrected (SP: [6x4x][4 2] and [4 6x][4x 2]).

With **clubs** it's easiest to throw triple-simple-double. Therefore, first train on good triples. If you then juggle it, only think about the four. It's strange, but it is the 4 that makes the pattern pop or drop. It's also possible in high double - low simple - high simple. It's hard to change the spin every time, but it has a certain rhythm I like a lot. The strange rhythm is a rhythm between perfectly ASS and the S stabilisation pattern (SP) [6x4x][42].

Variation's

4 534 Reverse O=30

Popcorn is a nice pattern to throw reversed. Pay attention to your 3's, cause sometimes they are so low that you don't really see them anymore.

4 Backcrosses or cartwheels

The 5's are possible as backcrosses, the 4's as cartwheels.

4 642 *O=20 !=35*

642 is a beautiful pattern, but only if the props fly perfectly straight up.
LM4, LP: 612, 6420, 642(4)
The problem will almost certainly be to keep the 4 low enough. Just try to throw an extreme high 6 and an extreme low 4. If the distance between the four and the 6 is still not big enough, try to throw it even more extreme. If it is too big, lower it a bit. This is a learning method you can use for a lot of problems.
SP: it's a very stable pattern, do what ever you like.
Clubs. With clubs it is sometimes hard to throw to the right height. Height 6 is normally possible with a slow triple or with a very slow double. But it is hard to combine such slow spinning throws with the faster spin of other throws. Height 3 will always be shit. However, 642 doesn't includes a 3 and is therefore a good club pattern. But, there's even more. 642 is such a stable pattern that you can actually throw the six as high or low as you want. Therefore it is very doable to do the 642 in high doubles. Even if they are not really high enough, the pattern will work, but the rhythm will be a little awkward.
You can train on height 6 in double by doing this pattern and highering your doubles until the rhythm is perfectly ASS.
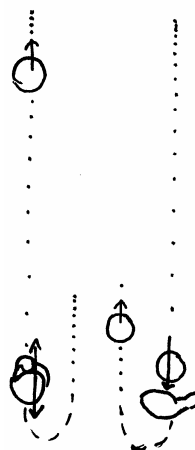
Variations:

4 642 with a thrown 2 O=40

Height two can be a little throw. It's hard to do, and it normally looks clumsy. Therefore it's a very rare thing to see. However in 642 columns it's nice. ***Guy Waerenburgh,*** does it fluently with clubs, throwing a flat over the other arm.
LP: 6020 with a thrown 2.
Throw the 6 and 4 a bit higher than usual.

4 642 Columns O=20 !=35

The 642 columns is a variation to do on the basic pattern in columns. First train the normal i642 and the 4444 in columns (see basic patterns). Throw the first 6 on throw a, on the outside of the pattern. The 4 and the 2 will be on the inside then. Make a vertical move with the 2. Fast up and down or down and up (this one is slower). To stable, throw high 6's.
It's also possible to do a 64244 columns variation, therefore throw the first six on the d throw.

4 642 flick !=70

This is a furious and fantastic variation. A flip is a very fast simple spin throw on a pause. Triples or doubles or possible, but both need the simple 4's (with triples fast doubles are also possible but harder). There are other moves possible on the pause, but the flip is certainly the most impressive.
If you throw the 642 only ones, it is best seen from the side.
There is a lot possible with half flips. As it is always the 4 that is caught to be flipped, you can throw one and a half spin and do a half flip after it (triple 6).
If you do the 4 in a half spin, followed by a half flip, 6's in simple become possible. It feels great to train this in one hand (602040).

4 633, Rockets O=30 !=50

Rockets is a four ball pattern in which one ball is thrown high up, so that a three ball cascade can be juggled while the high ball is in the air.
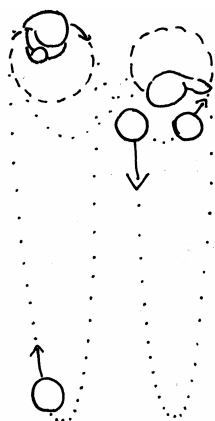
LM4, LP: 612, 6330(3), 642(4), 633(4), 6334
612 and 6330(3) are patterns to learn height 6. 6330(3) is the best. Then try the four ball pattern 642(4). Make sure that you end up in an ASS four ball fountain again. If that is not the case, throw your 6 higher. 6334 is a good LP because the 6 stays in the same hand. Finally try 633.
Normally, throwing good high 6's and low 3's should make the pattern stable. This works, but not 100% and high 6's are not that easy. Another way to stable is explained on in lesson X. Throw the second 3 a little higher than the first one (or as it will feel; throw the first one a little lower), and throw that first 3 only a split after the 6. (SP: [6x4x][4x2]). You'll see that it makes the pattern a lot more

stable. If you throw the pattern as this, you'll notice that the 6's don't have to be so high at all.

For **clubs**, 633 isn't as interesting as with balls. The high throws are too high and the low throws are to slow to give a good impression. It can of course always be fun to try.
Triples (or even quads) are easiest, but slow doubles are possible to, if you keep the first 3 low, and throw it immediately after the 6.

Variations

4 6334 O=28 !=50

The 6334 is a pattern that can be interesting, because the four stays the same ball.

4 63353 O=38 !=50

This is a nice combination of two patterns. If you throw the six reversed on the outside of the pattern, and the five vertical in the centre of the pattern, you create a kind of Rockets with three Rockets. The 3 after the 5 must be thrown very wide and low. 635613 creates the same effect. It is discussed a bit further.

4 633 Machine O=45

See chapter 8: Styles

## 4 561 O=30 !=45

This is a high state pattern, you need to start with three balls in the starting hand, or throw a 5 linking throw (LT) out of the fountain. It's a nice and enjoyable pattern to throw. It's a good pattern to learn height six with a large throwing circle.
As a variation you can throw the 6 on the outside as a column throw, and the 5 on the inside as a column throw, then you avoid collisions and you end up in a nice vertical pattern. If you do so you can keep the throwing circles really small, and therefore juggle the pattern really low.
With **clubs**, juggle the column variation. It's possible on about every spin combination, because it's Stabilisation Pattern is [6x 2][2x 6]* and in the column variation you can throw really fast. Therefor, TT, TD, DD, DS, and SS are all possible. I Like SS.
It is a nice pattern to combine with 635613, 5561551, 66161 and 5551.
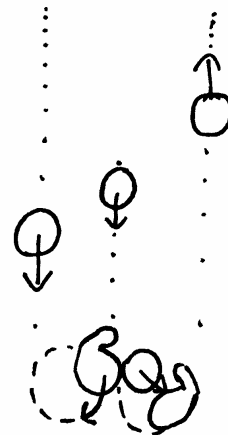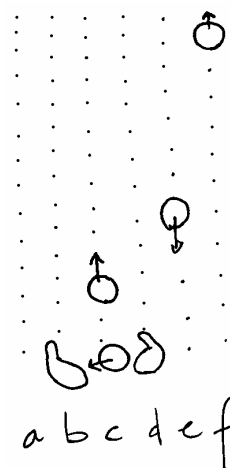
4 62 Three in one hand

See more 60

4 66161 O=45 !=∞

An enjoyable pattern, and good to train height 6. Also possible with clubs.
LT;: 5. LP: 6161610, 60

Variations

4 *The wall* *O=50*

Imagine there are six straight lines in front of you can throw (see ill.). From the right to the left call them a,b,c,...,f. Start throwing with the right hand.

Throw: 6a 6d 1c->e 6^e 1b->f
Then the opposite : 6f 6c 1d->b 6b 1e->a

4 *75161* *O=45*

Throw a 75 instead of a 66. It's easiest to do the 6 on the outside.

4 635613 *O=40*

This is a pattern that looks like shit if you see it written, but it can be nice if you see it. A variation on it makes it look like rockets, but with a little rocket in the middle. To create that image, the five is thrown vertically in the centre and the sixes straight up on the outside. As the 5 is thrown two count after the first 6, it drops two count before the second 6. Therefore it looks as it is thrown perfectly between the 6's.
LM4, LP: 633, (63353), 561

Variations on the 63 entry

4 6352, 63623, 63641, 63551, 6366151, 637233, 63723623, 637413, 6375151

4 6461641 *O=45*

It is always nice in long patterns if there are only a few heights, and it's fun if it is a bit confusing.
LM4, LP: 6161601, 6451, 642.
It's a lot less confusing if you know that there are three consecutive 6's in the same hand.

4 Other patterns with a 64 entry are: 64613, 646152 and 6461551.
4 Some patterns with a 66 or 67 entry are: 6631(4), 6622(4), 6716161 and 67313.

4 5561551 *O=45*

This is a funny pattern to juggle. It's as confusing as it can get.
LM4, LP: 5551, 561, 556152
4 Combine this one with **5551, 566151, 556166151, 566161661551, 566161551** and **556156166161561551** if you don't find it confusing enough. (Allowing height 3, these become interesting too: 635613, 55613, 6366151, 63551 and 63353)

4 *Other patterns with a 55 entry are:*

55613, 556152, 557133 (can be combined with **733551**), **55713344** and **5571451**

4 5671234 and 567801234 *O=50,60*

Both patterns are normally written as this: 1234567 and 012345678, cause that's what you see. The balls fly higher and higher. The patterns are very

similar to the three ball patterns 45123 and 4560123, but the created image of the expanding heights is so much better.

LM4, LP: 4560123, 56234,567123(4), 5678123(4), 6712
To avoid collisions, start throwing with the hands close to each other, so that the even throws are more easily thrown around the odd heights. It is also more beautiful to juggle the pattern as that, the odd heights and even heights look very much alike, what increases the image.

4 Variations

As said in chapter 3 these patterns are ideal to get in or out a shower, or in or out four in one hand.

4 Other patterns with a 56 entry are:
5623(4), 5641(4), 56252, 5626252, 56716151 and 566151

4 7333 O=38 !=55

7333 is a good pattern to learn height seven. It isn't beautiful cause it's always the same hand that has to throw the 7.
LM4, LP 73131(3), 633. Just try to throw high enough, and don't wait after throwing the 7.
It will help if the 7 is thrown a bit too high. To avoid collisions, you can throw the 7 on the outside.

Variations and similar patterns

4 7333444 O=40

If you ad three 4's, the length of the pattern is seven. Therefor it is always the same ball that is thrown high over to the other hand. To stress the seven even more, and to avoid collisions, throw the seven on the outside.
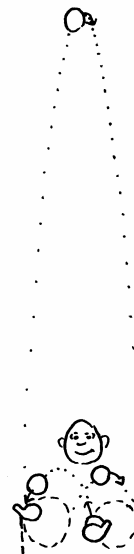
4 53633733 O=40

Fun to try. If you throw a ball high up, you can continue a juggling three balls until it comes down again. That's what this pattern is all about. You can try 83333 and 933333 too. It can be interesting for five ball patterns, but for four balls such extreme heights aren't really interesting. It can be fun to try, but it gets dull fast.

4 7441, 74414 and 7441444 O=40 !=55

I like these patterns a lot more than the 7333 patterns. In the 7333, the three 3's can not only be replaced by 441, but by every three ball low state pattern of length three. That gives 7531, 7423, 7342. You can play with 73337333 too. This gives: 733-**5713**-3, and 7333473334 gives 7333-**57413**-4.

4 7471414 *O*=40

This is the best of the 74 entries.
LM4, LP: 747141, 7441, 444747171…717141444…

4 *Others with a 74 entry are:*

74252, 7427242, 74612, 7471613, 74617133. Of which 7427242 is probably the most interesting one.

4 7531 *O*=45 !=65

This is a very nice pattern, but it stays in the same hand. It is a very good pattern for a start and stop. Throw it up, catch and stop.

4 75251 and 75611 are two other patterns possible with a 75 entry

4 575151 *O*=25 !=40

Not very interesting, but it's nice that one hand always throws 5's. You can combine with patterns as 53 and 5551 if you like that.

4 Other patterns with a 57 entry are: **57242, 5726251, 5727242, 577131** and **572726151**.

4 737371 *O*=30

This is about the best of the 73 entry's.

4 Others are: 73352, 73631, 733551, 733623, 733641, 73366151, 73375151, 73451, 734613, 734616414, 7372612.
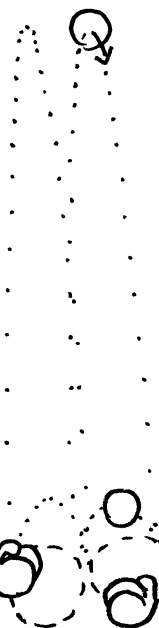
4 723 *O*=40 !=60

This is a very nice pattern. The 3 always jumps the queue.

LT: 5; LP: 7333, 70370304, 741
It's hard to keep the 3's low enough. Focus on those 3's.

Variations

4 *Switch out of 552*

It's nice to switch into the 723 out of the 525 (552). Therefore throw:
(5)525 525 723 723 …

4 *723 weave O=45*

This variation is easier than it looks. The 7 is always thrown with the ball that has done the weave, therefor it has a lot of speed and flies naturally high. The 3 isn't proceeded by a weave and stays therefor low.

Again it is possible and nice to do it out of the 525 weave.

The same switch is possible out of the (4,4)23 multiplex pattern. Again, the weave version is possible.

4 741 O=40

The 7 and the 4 (and the 1) reach their highest point on the same moment, and come then down to the same hand. That creates a nice effect.

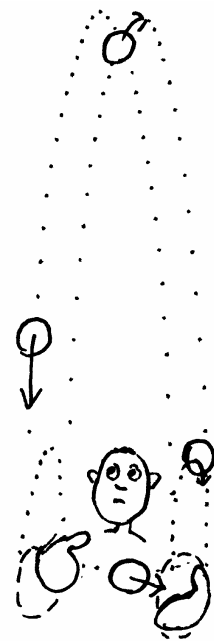LP 7441, 74170122
Low 4's are the secret.
It's a good pattern to learn to learn 744 and 771. Especially to learn the 744 with clubs, it's a very good exercise to train on low 4's.

4 Other patterns of lesser interest are: 5713, 661713, 6712, 751713 and 8413

4 714 O=45

It's a bit harder than 741, but just as much fun to juggle.
LT: 55; LP: 741

Variations

4 It's fun to throw the 7 reverse (and it's not as hard as you would expect).
4 You can switch out of the (5,4)21 multiplex pattern. Throw a 7 instead of the 2 once and you'll end up in the 714.
4 Other patterns with a 55 linking throw are 7162, 717261 and 8134.

4 7070707 The four prop snake O=90

This is a very good pattern to learn seven props.
Start with the hand that holds four props. If you wanna do it out of the fountain you'll need a 56 linking throw (5677070707707070…)

4 831 O=50

Not really fun. Enjoyable for those who like to throw high and good to learn height 8, to do patterns as 834, 861, 852 or 855.
LP: 831830022, or just try it. LT: 6 or 833

Variations

4 As it has a linking throw 6 you can do it out of rockets. Throw 6336336831831…
4 You can switch into it out of 5 (3,3)1 by throwing: 5(3,3)1 8(4,3)1 831 831…

4 80 Four balls in one hand O=90

LT: 567. LP: 60, 8040, 808020, 80808000.
This gets really hard.
Make your throwing circles as large as possible.

Variations

It's hard to imagine, but some jugglers try variations on this pattern. The most easy ones are:

4 ***Column throws or a fountain pattern*** (similar to 60).

4 ***10 0 6 0***, With rebound balls this is still doable, but in the air, it's nuts.

4 Starting out of Mill's mess is easier than you would expect. Of course it isn't easy. Throw the linking throws 567 as this: the 5 on the c throw, the 6 on the a throw, the 7 on the b throw and then the 8's with very large throwing circles.

The mills mess makes avoiding collisions in the linking throws easier, than the normal fountain pattern.

4 Other high state patterns of little interest are: 6811, 7315, 9313, 9511, 67070, 617172, 9124 and 9115.

Five props

Pure technically spoken, the more props you juggle, the more patterns are possible. On the other hand, the more props, the less patterns we are able to juggle. So once you're juggling more than four props, it's not a question of what is technically possible anymore, but a question of what is possible practically. Therefore, I haven't tried to give you as much nice patterns as possible. Most of the difficult patterns are just not worth the effort to learn them.
If you would be interested to find some more patterns, you can always use pattern generator 1 and 2 and the following two rules:

1) If you ad 1 to every height, you end up in a pattern with one prop more.
   Fe: 300 -> 411 -> 522 -> 633 -> **744** -> 855 -> 966
2) If you ad the length of the pattern to one of the heights, you end up in a pattern with one prop more
   Fe: 111 -> 411 -> 441 -> 741-> **744** -> 774 -> 777

Generally, juggle five prop site swap patterns if you like them, but for an audience, there are only a few interesting ones. So don't train a lot of site swaps to get a good show, try other stuff.
As I have said for three balls, try to search for other things than those basic site swap patterns. With five props, there are a lot of things possible with multiplexes and rebound balls.
With **clubs** the possibilities come to an end. There are only a few five club patterns that are juggled. There are some possibilities with multiplexes but not much.

Before trying site swap patterns, make sure that you have a stable five prop cascade. Then try the reverse cascade (balls) and the easiest Synchronous patterns ([6x4x] and [6x4]*). Then you're ready for it. I guess the easiest patterns are 77722(5), 6662, 66661, 744 and 645.

5 64(5) O=48 !=70

Throwing a 64 while juggling the five ball cascade is harder than you would expect. It's natural to throw the 4 too high. You can train on a low 4 by training 64 continuously.
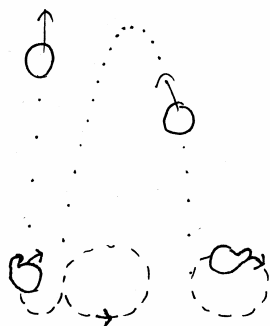
Another problem is the collision of the 6 and the 5 thrown just before it. There are two possible solutions to it. You can throw a reverse six. This is what most jugglers do if a high vertical throw follows on a lower diagonal throw.
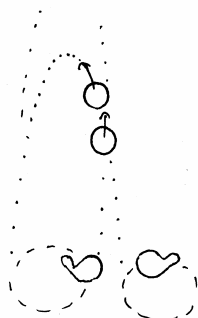
A second solution is throwing the 5 and the 6 with big throwing circles. This method is probably a bit harder, but it is a good exercise to train the large throwing circles necessary to juggle six balls. So if you want to learn six balls I advise to chose this method.
With **clubs**, 6 in triples, 4 in simples, 5 in doubles.

5 64, 645 and 64645 *O=55 !=90*

LP: 60, 6662. 64 is really ugly, but it is a very good pattern to learn the 6 ball fountain (and other patterns as 864). To juggle 645, focus on high 6's. The stability pattern is [2 8][4 6x]*. 64645 has a totally different feeling than 645. It is the second 6 that rules the pattern. Throw that 6 good and high, and the whole pattern runs smoothly (SP: [2 6][4 8][4 6x]).
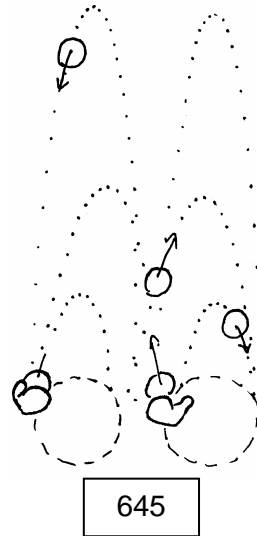
5 663 *O=75 !=∞*

LM4, LP: 633, 660
Patterns with two consecutive high throws are always hard. Try to throw the second 6 at least as high as the first one. Throw the three as low as possible.
With **clubs**, this one is really hard, cause the 3 always flies too high. Nevertheless there are jugglers that juggle it. At the European convention of Rotterdam I saw *Falk Hante* juggling it with ease.

645

5 666660 and 6662 *O=50 !=∞*

These pattern aren't beautiful, but they are good learning patterns. It is important that the hand that juggles three balls rules the pattern. The other hand has to follow. The 6 with the other hand has to be perfectly in the rhythm and to the same height.
As a game you can throw up to height 5 with the hand that juggles two balls. Then, you go constantly in and out synchronous

5 66661 *O=50 !=∞*

This pattern is similar to the 441 and the 5551.
LM4, LP: 60, 666600 can help, but you can try it without training 666600 too
It' hard to switch from the five prop cascade to the 66661.
It is possible with **clubs**. If you throw it in a five club cascade, it is easier if you throw the first two 6's on the outside.

5 666716661, 66771661 and 6777161 *O=70*

Change some 6's into 7's and you get these nice patterns. I like them a lot, because they are confusing, but not really hard. If you like them, to you can try these bastards too:
5 66671777161, 666716771661, 6667166716661, 666716671777161, 6667166717771716661, 66771771661, 667716716661, 66771671777161, 67771716661, 6777171777161, 666716671777171671771671777161, ...

5 6782345, 678912345 and 6789 10 012345

O=80, 90,∞
These patterns are all very hard and very beautiful. They create the same image as the 5671234 and the 567801234 with four balls.
LP: 5671234, 567801234, 67345
Again, make very big throwing circles.

5 Some other patterns with a 67, 68 or 69 entry are: **67345**, **6752**, **67561 and 67363 67741**, **67723**, **68353**, **68344**, **686262**, **68551**, **68641**, **6965151**, **695514 and 69524.**

5 744 *O*=60 !=100

This is a very nice pattern, perhaps the most interesting pattern with five props. It is one of the most doable patterns with five **clubs**.

LP: 7441, 741, 714, 744(5). First try to get one 744 in the five ball cascade Throw a wide cascade pattern so that you have enough place to throw the 7. Keep the 4's low.

Then go for 744. At first you'll probably get rhythm problems. Fight it, it will vanish. It's normally because you throw the 4's too fast after each other. Throwing them too fast doesn't destroys the pattern, but it ruins the rhythm.

With **clubs** there are several spin possibilities. Slow, high triples with simples is easiest, beautiful and mostly done. The 7's can be quads too. 7's in doubles becomes possible if the 4's are half's. The first 4 must than be a half throw handle to body, the second must be a half from body to handle. It looks hard to throw 4's as half's, but it isn't much harder than throwing low simples.

I like cold start best, but starting out of the cascade is possible too. Therefore, juggle the cascade quite low.

5 Other patterns with a 74 entry are: **74734, 747741, 774714**

5 753 *O*=80 !=∞

The 7, 5 and 3 all peak in the centre on the same moment, which makes this a fabulous pattern. LP: 75300, 7531, 753(5), 744. Once you can do the 744(5) with balls, you must try this one too. You can start it out of the cascade, but it's easier to start cold. Out of a cascade, juggle quit fast and pay most attention to the 5.

It can be fun to throw this pattern with two jugglers. If both jugglers juggle the five ball cascade with one hand, one juggler can throw a 7 followed by a 3. The other juggler has to continue the normal height 5 throws, therefor you can throw this without warning the your friend.

To juggle 753 continuous, be aware that its stability pattern is [8x6x][4x2]*. It helps a lot if you know this, cause otherwise it's natural to throw a high seven and then a fast 53, but it breaks down the pattern. Throw a fast 75 instead, and then a 3. That makes the pattern a lot easier. Once you have a stable pattern, try to throw perfectly ASS again, cause it's much lovelier, as they peak perfectly together then.

With **clubs** it's extremely hard to throw this pattern. Throw slow triple, quite a fast double, fast simple. It's always the five that demolishes it. Therefore, don't only focus on the height seven, but also (or even more) on the 5.

5 771 *O*=70 !=100

An enjoyable high state pattern. LT: 66. Cold start with the ha,nd that holds three balls.

Here are some other doable high state patterns::

(6)672, (6)77272, (6)757173, (6)834, (6)85813, (6)83833, (66)861, (66)825, (66)7266716, (66)78172, (667)915, (67)78181, (7)933, and (7)942, can be worth the effort.

5 77722(5) and 7777700(5) *O*=50 !=∞

Both patterns are very good to learn seven balls. They aren't very difficult too.

LM4, LP: a good five-ball cascade is what you need.

It is important to change not only the height on which you throw, but also the angle. The sevens have need to be thrown almost straight up. If you keep the same angle as for your 5's, the fly way too wide. If you throw them more straight, they will collide with the 5's unless you make larger throwing circles (or if you wait a a split second before throwing the sevens).

Variations

5 *77731* **O=55**

Throw 31 instead of two pauses.

5 Pirouette or half pirouette.

Two consecutive pauses, or two consecutive zero's give enough time to do a pirouette or a half pirouette.

5 8444(5) and 94444(5) O=55 !=60

LP: 744, 8040, 83333, 933333. Try it. You'll see that you have to throw the 8 or 9 really high. Focus on your biceps when throwing so high. The secret is low and fast 4's. If you throw your 4's two inches too high, your nine will have to be three foot higher.

5 Variations and similar patterns

Instead of throwing 444 or 4444, you can throw every low state four prop pattern. The best ones are: **8642, 8552, 95551** and **97531**. 97531 is nice to throw just ones. Start and catch. Look at the illustration

Jason Garfield, one of the very best jugglers of the world does the following pirouette with five clubs. He juggles doubles, throws an extremely high 9, then two 4's (doubles), half pirouette, another two 4's, half pirouette, and then continues his five club cascade. If you don't believe me, check out his site.

97531

5 Other patterns of some interest five balls:

933

This are some low state patterns: 7733, 75751, 77335, 9595151, 88441, 88333 and 97333. For more high state patterns look at the ones listed under 771.

If you like long patterns, then take a state table, only pick some heights and you'll find really nice patterns as:

8, 5 and 1 gives: 85518158518551
7, 4 and 1 gives: 774174, 774717741, 747771717741
9 and 3 gives: (6)939333 and (7)933

933 is a pattern that *Ben Beaver* likes to juggle. He uses 944 as linking throws. It looks astonishing, but I don't know if it's worth the effort.

More than five props

Site swap juggling with six or seven props is only possible for a very select group of jugglers. Finding the patterns is similar to what I've said about five props: the hard part isn't making the patterns.

To juggle them, use the stability theory, but more important: keep on training !

Chapter 5:

Synchronous patterns

What's that ?

As mentioned in the theory about S patterns, it are patterns in which both hands throw and catch on the same moment. The hands don't have to make the same throw, only the moment is important.

At first it seems strange to juggle synchronous, but ones you become used to it, you'll see that synchronous patterns are unbearable. They are very useful for variations that require pauses because they include lots of pauses, and because it's generally easier to use a S pause that an AS pause.

It may seem as if S patterns are harder as you sometimes have to throw different heights on the same moment. This isn't true. Ones you're used to them, they are just as easy as asynchronous patterns.

If this hasn't convinced you to juggle them yet I can only add that most juggling styles as Barrages or Revenges are based on Synchronous patterns.

Three props

3 42, two in one hand *O=1 !=15*

It may sound strange, two in one hand, synchronous. It means that if the pauses in the other hand is used, the other hand will move synchronously with the juggling hand.
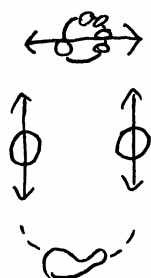
3 Variations

The S two in one hand is an inexhaustible source of three ball tricks. With clubs and rings there are a lot of possibilities too.
However I'll only give you the most common ones. The rest is up to you to create. There is a lot possible with bumping balls on your body as footkicks and so, but that all's explained in chapter 12.
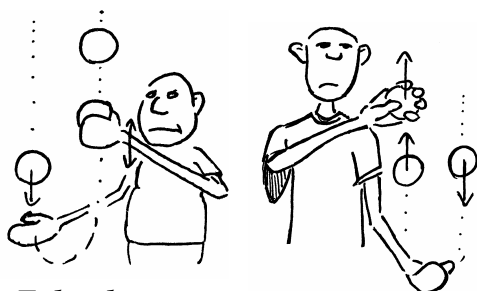

False box O=5
O=5

Magnet   O=4

String   O=4

The   orbit

3 The body cross swing *!=25*

LM7, LP: a solid 40 in simple columns, the mike swing, drop swing

Juggle two in one hand in columns. Swing a club through it, above the dropping centre club, and under the rising outward club. The most elegant way to swing a club through it is the body cross swing (see Mike's mess swing, chapter X). Therefore, start with a drop swing and continue the movement by swinging it through the other clubs to do the body cross swing, and come back.
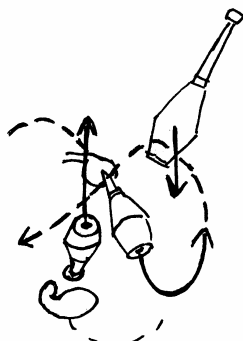
You can either continue with a drop swing and then orbitting through the other clubs, you can throw a 4x and do the same on the other side. (See 4x2 42 variation knitting)

3 Helicopter *! =25*

LM7, LP: a solid two in one hand in doubles.
Juggle two in one hand in doubles. Swing the other club above your head as a helicopter. It's easiest to swing it counter clockwise with the right hand.

3 Fake machine *O=5*

Juggle column, do the magnet in which the hand follows next to the closest hand. When your hand peaks, instead of going down, move it sideways through the juggling pattern. Move above the descending closest ball, and under the peaking (when you reach the other side it peaks) farest ball. Get your hand back to it's side.
This trick works confusing when you mix it up with
the machine, explained in chapter 13.
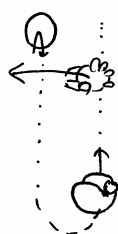
3 Loop *!=20*
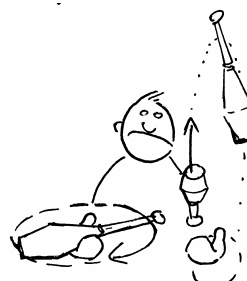
LM7, LP: a solid two in one hand in doubles or simples
Juggle two in one hand. Loops in the other hand. If you learn it doubles will be easier. Loop twice on every throw. Then learn loop in simples. Ones you'll get used to it, it will become easier then doubles. Loop once on every throw (that's a bit slower).
If you want to move your loop-hand up, or orbit with it, finger loop will be needed, but for the normally, a normal loop looks so much better.

3 4x2*, Cascade with pauses O=2 !=10

See more chapter 2: basic patterns

3 42x*, The box O=10 !=20

Although this pattern doesn't has pauses, there are many magnificent variations possible with it. It's called the box because it has a box shape.

LP: [42x][2x0]*, [4x2x] (the shower), on both sides.
For rings or clubs this pattern isn't really great, so take **balls**.
It's confusing if you can already juggle the 441. Try to forget the 441 for a moment. First train on throwing the 4 and the 2x perfectly on the same moment, with two balls. Then, go for the [42x][2x0]* pattern, which is the same, but snapping the 2x back before the 4 drops, and then doing the same on the other side.
If that works, take a third ball. Take two balls in the hand that starts snapping.

To **improve** your box, you should throw perfectly S, but more important, the 2x needs to be perfectly flat. Most jugglers have a low and a high hand when they learn it. As it is sometimes hard to feel that, ask others if you aren't slanting. If so try to do the opposite.
Second try to keep the hands wide, far from each other.

Variations:

3 The double box 4x2x 42x   O=11

Juggle the box. After throwing the 42x, move your hands so that the other hand comes under the 4. Repeat a 42x on the same side. Do the mirror to go back.
The first 42x has become a 4x2x because you have moved your arms. You threw the ball straight up, but it's the other hand that catches it, so it is a 4x.
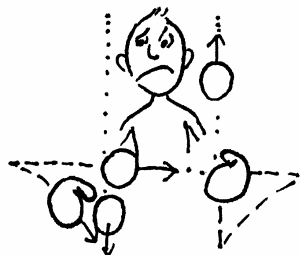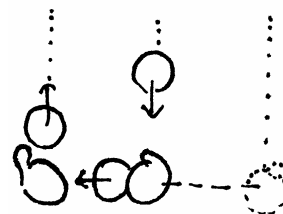
3 Luke's shuffle O=35

Luke's shuffle is an impressive but hard to master variation. First train the shuffle with two balls. To juggle it with three, the secret is throwing the 4 a split before the shuffled 2x as it comes really fast into your hand. Release the 4 when your other hand is at it's extreme outside (①). Beside of this, making a large throw movement (see ill.) also helps a lot.

3 Backsnap box O=55

There's a lot possible with back-snaps, back-catches, cartwheels… Snapping every 2x behind the back gives a wonderful result.

After training this with one ball, don't try three balls immediately. First go for two balls. Throw the 4 up synchronously with the 2x backsnap. This is a lot harder already than the simple backsnap. Slow the backsnap down, and throw the 4 with the wrist.
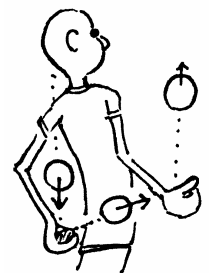
Stefan Sing, perhaps the best 3 ball juggler of the world masters a whole serie of variations on this

trick.

One of them is this: after throwing the 2x4, he catches and controls the 4 on his temple. Then lets it drop back in and does the same on the other side.

3 The split box. 82x 42x 2x0 *O=35*

LM3 LP: 42x, 80 40. The 80 40 only has to work a very little bit.

The split box is a hard to master variation. Height 8 is an extreme height in three ball juggling, but it is very good to learn the split box with four balls (82x 42x).

Juggle the box, as low and fast as you can. Then throw an 8 instead of a 4. Throw 42x on the same side, very low and fast. Snap the 2x back. And continue the box. Ones you can do this fluently, go straight into the split box on the other side.

It's possible to throw the 4 extremely low, as the 2 can be caught and popped back very fast. If you do so, you can throw the 8 on the height of a normal six.
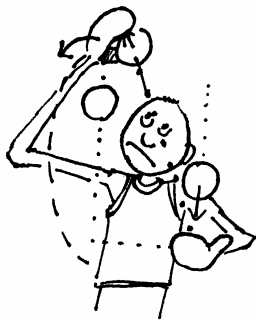
3 High to low snap box *O=40*

This is a very fast and furious 3 ball variation, that can be really fantastic if it's done clean.

Instead of snapping horizontal, snap upwards diagonal ones. The other hand will need to move up very fast catch the 2 just above the peaking 4, and snap it back. Then it has to move down very fast to catch the 4.

The key to this trick is throwing a low 4 when your hand has to move up. To avoid collisions, you can throw the 2x a split earlier than the 4.

3 High snap box *O=50*

Ones above, you can snap horizontal instead of downwards again, but it gets even harder then. It's normally done just ones, then down again.

To do it, it's easier if you snap the upward 2x under the peaking 4 instead of above as in the previous trick. Once above, slow the 2x down. It's easier to aim the 2x if you make a large arm movement (as in Luke's shuffle).

3 Cross box, (Caja de Marco) *O=30 !=50*

Throw two 4's crossed. The hand that threw crossed first, moves to the other side while snapping, and catches the ball, crossed under the other arm. Then the same continues on the other side. To continue, always stress the 2x move, otherwise you'll catch with the wrong hand.

Marco Antonio Bautista, controls this fluent with clubs, in doubles and simples.

3 42 4x2 *O=2 !=10*

This is a very simple but interesting pattern, because it gives you two consecutive pauses in one hand. With **clubs**, it's a good exercise to learn height 4 in simples.

LP: 42 42 and 4x2. Try to feel the pauses. You have to feel them if you want to do something with them.

Variations

When throwing low 4's (simples with clubs), you get a double pause in one hand followed by a double pause in the other, which is of course really interesting. With **clubs** it can be interesting to throw high 4's (high doubles) and juggle binary. It will make you end up in something like 62 22 6x2 22 which leaves you with four pauses, on which you can do extremely complex swings-slams-finkertricks or whatever.

3 42 4x2 Columns *O=2 !=10*

If you throw the 4x in the centre, you can throw it straight up, and still catch it with the other hand. This is a simple but useful variation. Make sure the 4x is high, otherwise you're doing the 4é", which only has one pause.

3 Fake 44 4x0 columns O=4

LP: 44 4x0, 42 4x2

Juggle the 42 4x2 columns. On the first pause, go up with your hand, so that the ball that you hold goes up as if it was thrown up. On the second pause go down again, as if the ball drops. The result is that you see two balls going straight up as in the 44 4x0 columns.

3 Backstroke O=20 !=30

This variation looks best with clubs, seen from the side. Make a big circle with a stretched arm. Try to start on the same moment of the 4 (simple) in the other hand, that creates an astonishing effect.

3 Crawl O=20 !=30

Do the same swing your arms in the other direction.

3 Knitting O=20 !=35

LP: the body cross swing variation on [42]* on both sides.

This trick is actually just the same as the body cross swing explained earlier in this chapter, only here you switch sides as soon as possible. To do so you need to juggle 42 4x2 in columns. After throwing the 4x, catch the outside club, let it drop swing and continue the club movement by doing a body cross swing (between the other clubs) on the other side of your body. At the end of the swing, throw and start swinging on the other side synchronously.

Improve this by swinging perfectly in the nose plane. Try to search variations by combining with other swing-patterns as Rubenstein's revenge, Burke's barrage, Reverse knitting, drop swing,... and search for half and quarter pirouettes.

3 Jochen's [42][4x2]* !=70

Illustration

Do you get it?
The double pause is an arm swing
The 4 a reverse dip
The 4x a backcross
The inventor, a German.

To do it, make sure that the backcross is high, slow, and stays far back.

3 Two swings !=35

Juggle 42 4x2 in simples, do a drop swing on the first pause and a reverse drop swing on the second. It's confusing at first, but it feels smooth and looks funny seen from the side.

3 [44] [40] and [44][4x0]*, Columns O=3 !=15
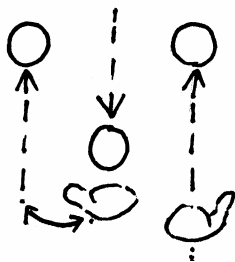
Learning it

LP: 33, 4x2, 40, [44][00]

Both hands throw a ball straight up to height 4. When the balls peaks, the hand that holds the third ball throws it up to height 4 between the other balls. Both hands catch the first thrown balls and continue the same.

With clubs it is a good pattern to learn doubles and two in one hand. Throw a three club cascade. Then throw a double straight up in the

middle of the pattern. Throw two clubs simultaneous, straight up and catch the incoming club. Continue the cascade.

Variations

[44][4x0]* is a very good pattern for hard throw variations. This because it has a 4 followed by a zero in one hand. This means that you don't have to catch and throw while the 4 is in the air. Therefore, throws that result between slow 2's or fast 4's are ideal here. Treblas, alberts, armpit throws, gilli's, belly cross cartwheel... all become a lot easier.

However, I'll start with a few easy ones:

3 **Crossing columns** *O=4*
Let the two synchronous balls cross

3 **Rainbow columns** *O=4*
Let the NS ball change hands on the outside

3 **Symmetric columns** *O=4*
Let the not-synchronous ball change hands on the inside

3 **Cascade columns** *O=4*
Let the not-synchronous ball fly in an eight-form

3 **Shower columns** *O=5*
Let the not-synchronous ball fly around the other balls

3 **Box columns** *O=6*
Let the not-synchronous ball fly "under" the other balls

3 **Cross arm columns**

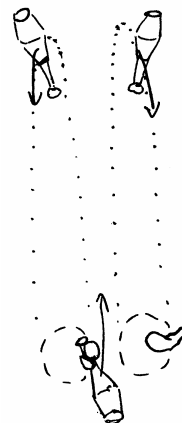Throw a bit higher. Cross the hands just after the asynchronous ball has been thrown and catch the synchronous balls with crossed arms. It will be easier if the two synchronous balls are crossed.

3 Backcatch variation (4x4x 4x0) O=35 !=45

Let the 4x0 cross wide, then throw a 4x with the same hand, and a backcatch 4x throw with the other. On the 0 move your arm behind your back and catch the backcatch throw.

3 Armpit variation ([44][4x0][44][04]) O=35 !=45*

LP: First train the armpit catch and throw.

Illustration

This trick is mostly done with balls, but it looks really nice with clubs (in simples) too.

When juggling the [44][4x0]*, with your best hand, throw the 4x wide to the other side. Throw the 44 also towards that side, so that you can catch the prop most in the center under the armpit. On the zero, cross your arm behind your back, so that you can catch under the other armpit. On the same moment throw a 4 with the other arm. Catch the incoming 4's. To throw from under the armpit, let your arm go down a bit.

If you want you can do the same thing on the other side immediately

3 6x4 20

This is another pattern in which there is a hand that throws a 4 followed by a 0. Again this makes it possible to make some nasty throwing variations on the 4.

This pattern is juggled a lot by flashy style club jugglers. The 6 is thrown as a high double, the 4 as a fast simple. It looks the same as the 4x2 flick in doubles (and is actually the same), only here there's a lot more possible with the simple throw (4 resp. 2). A much attempted throw variation on the 4 is trebla, a gilli or a reverse backslam. I'm not sure, but I think these were all inventions of Gay Gilligan (thank you).

Four props

Synchronous patterns with four are really fun. A lot of patterns include pauses which can be used. They are the basic patterns of most of the four prop styles.
Height six is an ingredient in almost every pattern. It's quite hard to learn but you'll get used to them.
With **clubs**, a lot of patterns feel much better once you can throw those 6's in doubles. Triples are always possible too, but quats won't do it anymore. To throw 6's in doubles or triples, your 4's will have to be simples. Therefore it is crucial to master the fountain in simples.

4 6442 family *O=30 !=45*

6424 is the basic pattern of the 6442 family. They are all compatible, require about the same level to juggle and give about the same joy. By catching props with a crossed arm, you can mix them up even more. A prop caught with crossed arms had to be thrown straight up if it was an x, and crossed if not. More about this in chapter 13, but you can experiment now already if you want. They are not only fun, but they are useful to learn the 64 family with five props. And they can be quite nice.
With **clubs** you can do them in triple single, or in double single. I like them more in double single.

LP: 44, the 5 switch to ASS, 64 00 02, 64 20, 64 24 44.
Just try it. If the 6 doesn't drops in the S rhythm, make sure that the four thrown synchronously with the 6 isn't higher than the other 4's. If the six still doesn't drops in the rhythm, you'll have to throw the 6 higher.

Other members of the family are easily found on the state tables:
64 4x2x, 64 24, 64x 4x2, 64x 2x4, 6x4 24x, 6x4 42x, 6x4x 42 and 6x4x 2x4x.
64x 24x; 6x4x 42 and 6x4x 2x4x I like most.
A quick look at the state tables futher shows that you can combine them easily with 44's and 62's.

Variations

4 Pau**se uses** *O=35 !=55*

If there's a pause in the pattern it can be used to do weaves, lifts (going fast up and down with a hand), flips or half flips. 64 24 and 6x4 4x2 or best for those things. In 6x4 4x2 and 64x 4x2, the caught 6x always becomes the pause. Therefore with clubs it is an ideal pattern to do a half flip variation by throwing the 6's in two and a half spin.
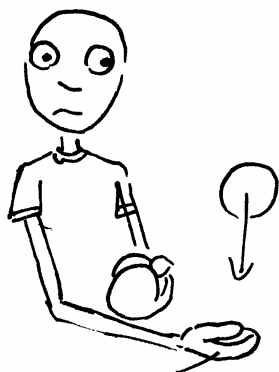
4 Other side catch O=40 !=60

The pause can also be used to move your arm back to it's side, after catching a prop on the other side (therefore throw it to that wrong side). Such variations are all very nice, but hard to master.
Fe: 6x4 4x2 becomes 6(x)4 4x2, catching the 6 under the other arm.

Another possibility to catch a prop on the other side is by splitting up the pause in two half pauses. One pause to get to the other side with an empty hand (= a zero), and one pause to get back, holding the prop for one count (=1). Therefore throw the prop that will be caught on the wrong side one height higher than you would normally do.
A very nice example of such a pattern is:
[54][6x4][4x1] derived from the pattern [44] [6x4] [4x2].
The 5 makes you go into an ASS pattern, the 1 brings you into the S pattern again.
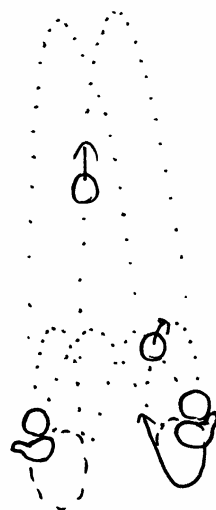
Try it, it's easier to do, than to understand.

4 Beyond site swap

The 64x 4x2 and the 6x4x 42 are the stabilisation patterns of 633 and 534. They are therefore stabilised by them, and you can switch into the 633 and 534 bit by bit.
The transition of the 64x 4x2 into the 633 machine is nice and smoothly.

4 66 22 Family *o=25 !=45*

66 22, 66 2x2x, 6x6x 22 and 6x6x 2x2x
These patterns are a lot less interesting. Still, they are fun to try.
The same sort of variations are possible as with the 6442 family.
6x6x 22 is good to do a half pirouette (then the 6x's are thrown straight up, and it are the hands that change side when making a half pirouette). With clubs this is doable in doubles.
If you juggle four balls a bit high, you can snap a [2x2x] just after throwing [6 6] up to the height that you throw the 4's. To succeed, you'll need to fasten the rhythm a lot at ones (see more rhythm change variations in chapter 14).

4 62* family

This is a very interesting family. As it has a pause on every throw it makes a lot of variations and styles possible. If the pause is snapped (2x), then we end up in four ball boxes.
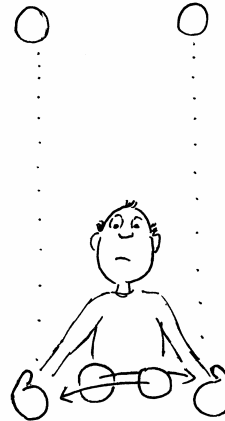If you look at the state tables, you'll see that they can't be started out of the basic 44 without linking throws. They are in other words high state patterns. The linking throw to get into them is always a kind of 64 (look at the state tables). For a cold start you'll normally have to start (throwing a six) with the hand that holds three props.
You'll also see that there are a lot of long combinations possible.

4 62* *o=20 !=40*

Is the simplest one. It's actually a very high four prop cascade.
The pauses can be used for weaves, flourishes, flips, half flips… (the usual stuff). There's a very nice barrage variation explained in chapter 13.
With clubs you can do it in slow doubles or triples.
If you do something fast on the pause, the needed height can be reduced a lot. With half flips for instance, it's possible to throw the 6's in one and a half spin.
LP: 44 high, 64 42, 642
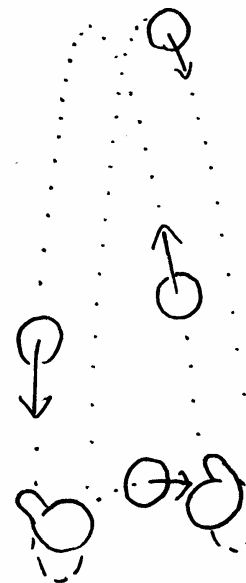
4 6x2x* The 2 count box *o=40 !=65*

This is the normal four prop box. There's one ball that is snapped all the time, while the others fly in a sort of giant three ball cascade (see →).
LP: 62, 6x2 6x2 26x 26x, 6x2 62x, 6x4 24x, 6x2x 6x2x (the shower).
To juggle this pattern, keep everything thin, and move your arms good downwards after catching a 6x.
If you do a cold start, hold two balls in each hand. Do the first two 6x's without 2x's, only then start to snap. Throw those two first 6x's very slow, only throw every two counts. To avoid the problem of starting too fast, you can start out of the fountain, with these linking throws: 6x4 26x.

Other boxes, in which the throws go straight up are:

4 62x 62x* The four count box *o=35*
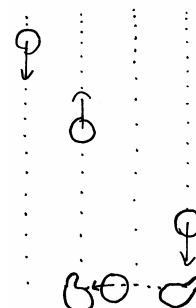
This is certainly the easiest one. You can throw the 6's as fountain throws or as column throws. For the last one it's best to throw out-in (a-c, d-b). In-out has an uncomfortable feeling. If one hand does in-out and the other out-in (a-b, c-d), it creates a wave effect. Reverse fountain throws give a pleasant feeling as well.
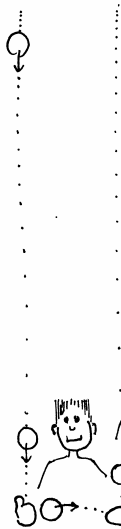
4 82x 42x* The split box o=50

This is perhaps the most astonishing four ball pattern there is. As is isn't possible to describe it's beauty in words, I've drawn an animation of it on the right side of the book.

LP: 62x 62x, 82 42 the last one, should work a bit in your bad hand too. Try to keep the 4 low, so that the 8 doesn't has to fly too high. Don't throw the 8's towards the outside.

4 Variation: [12 2x][8 2x][4 2x][2x 0]* o=70

If you do the previous pattern, it's possible to throw the 4 extremely low, because the 2x can be done very fast. Then the 8 can be done really low too (a good height 6). If you can do so, try to throw a 12 instead of an 8, and continue with 82x 42x 2x0. On a certain moment all the balls peak above each other on one vertical line. I love it.

If you want to continue the split box, mark that the 12 drops when you have to throw the 4. As the 12 normally isn't perfect (too low), it's natural too do a bad, too high 4. Mind that. Keep extra attention too a low 4

4 62x 62x 62* o=35

If you stay juggling 62 a bit longer, you create a longer box that includes some pauses. This is an example of it. Patterns longer than six count get boring.
It's nice if you throw the first prop crossed too, and catch it with the same arm, under (or above) the other arm (more about this in chapter 13: barrages).

4 6x2 62x* o=35

The same can be done with the two count box, to create a four count box with a pause. Adding a 62 however causes collisions. Therefore the last 2 has to be snapped, so that we arrive in 6x2 62x.
It is one of the few 62 patterns that looks nice with a weave in it. If you don't use the pause you can create a nice box by throwing the 6x straight up, a little over the centre of the pattern.

Fig 9.21 6x2 62x box

This pattern is the stabilisation pattern of 561, and is therefore stabilised by it. If you throw the second 6 too fast after the 6x (so if you don't hold it a full pause), you'll end up in 561.

If you want to make the pattern still longer, too have an even longer pause, 6x2 6x2 6x2x or 62 6x2 6x2 will be the awnser.

Five props or more
64 family

This is good looking family that offers some fairly easy patterns with five props. It are the first patterns you should learn ones you master the cascade.
They are becoming more and more popular in **club** juggling.
They are done in triple-simple or double-simple.
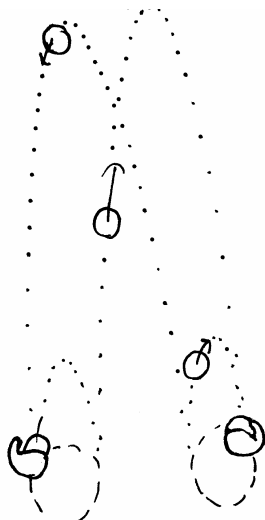
5 *6x4* O=45 !=75*

Learn it.
LP: 6x4x, 6x4 24x. With clubs, 6's in slow doubles (triples are harder).
6x4 is a very good basic pattern for S five-ball patterns. To train 8x4 44 for example, do it first ones in the 6x4. For most other patterns it's also easy to switch into them out of the 6x4.

5 *64 O=45*

This is a good pattern to improve your three in one hand to do the synchronous six ball fountain.
LP: 60, 64 42

5 *64x* O=50*

This one is a lot harder.
LP: 6x4x, 6x4, 64x 4x2
I prefer throwing the 6's as reverse fountain throws to avoid collisions. With clubs, doubles and triples are possible, I prefer triples.
It gets a lot more stable if you throw the 6's really high.
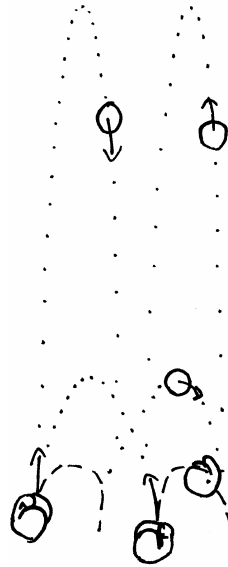
82 family

5 *8x2**

This is actually a very high five ball cascade. The pauses can be used for the usual stuff. But if you want to use pauses with five props there are easier patterns. Mark that the 8x's fly so high that the centre of concentration of the audience lays way above you, so that flick tricks (on the pauses) in your hand don't really match.

Toby Walkers masters the 8x2 pattern with five clubs, throwing two and a half spin and a half flip as pause.

5 *82x* O=70*

One ball is snapped all the time, the others fly in a giant fountain. Fast snaps can reduce the height eight a lot.

5 *82x 82x 82x 2x8 2x8 2x8 O=75*

The normal five ball box.

These are just the traditional patterns with five props, if you have the level, try to create more as I have done with four balls.

On the convention of York 2000 I've seen Ben Beaver trying the [12 2x][8 2x][4 2x], the triple headed box with five balls.

Other families

5 84 44 is one with five balls (8x4 44 *).
5 86 64 and 84 are the easiest families with six balls, 86 with seven.

Chapter 6: Multiplex

Intro

The needed definitions, theory and techniques on how to throw multiplexes is given in Part I: **lesson 5**.
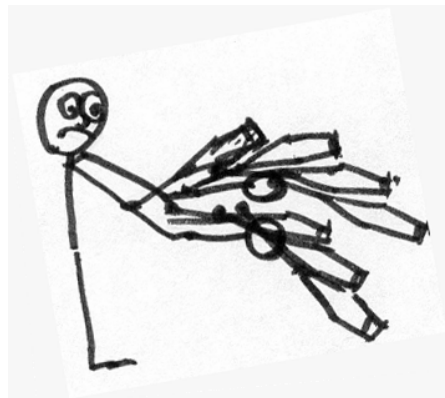
Multiplexes are usually written between brackets. I have written them between round brackets, separated by a comma.

To be correct the first number of most patterns should be the illegal 2 (the one that makes you end up with two props in one hand, cause that is the lowest state you pass through). But as nobody does it like that, I've written them mostly starting with the multiplex itself. This means that to start you will normally have to do a 3 (or 4 2, or...) linking throw to get started.

Starts and stops

It's not hard to throw up a lot of props at same time. Catching however…
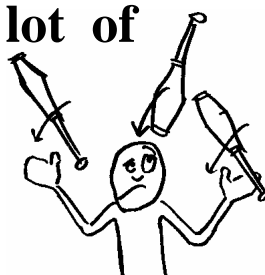
If you juggle a routine multiplex starts and stops are really important because they break the dull pace of tricks. Such stops stress the trick and stop before, and the start after it. A crazy catch and an impressive multiplex to start again are therefore very important.

If you search for such crazy catches, then above all search to catch multiplexes on special ways. Look at the catch possibilities in chapter 1. Although it's theoretically not necessary that all the props drop on a different moment if you catch them with different limbs, it will usually be a lot easier if they do. To make them drop one by one there's advise above and under. When searching for multiplex starts, you'll find a lot of throws that are possible to catch, but not to start juggling. You can try to search why (which prop has to come down later f.e.), but you can keep it as it is too. Just throwing everything up and catching again can be very nice.

However if you really want to start juggling, the techniques to make the props split more or less are explained above. I hope the illustrations of possibilities of starts can bring you on some ideas.

As I've said higher, try to search as much multiplex starts (and stops) as possible. They are beautiful and put a lot of stress on the pattern that follows. They brake the level of concentration. Starting a five prop cascade with one or two multiplexes for example really hasn't got to be that hard. Although you can go really hard too if you want, *Jochen Pfeiffer* starts his five club cascade by throwing them all five up at ones f.e.

Balls

Normal zigzag
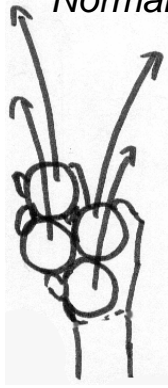
The balls split into two directions, perfect to catch and juggle on. They usually don't differ enough in height. Therefore bend the wrist, claw catch,…

One line

All the props drop in the centre. To continue juggling reverse cascade patterns are therefore easiest.

You can throw the multiplex reverse dip too. Then the balls drop next to each other, ideal to start juggling Mill's mess or Boston mess.

One line two arms

Again, reverse cascade is easiest to continue. The Gandini juggling company, ones used this multiplex to end a furious passing. One juggler held some six balls as this, and faced away from the stage. Behind her, the other jugglers were standing behind each other on a long line Then she threw them all high over her head, backwards. The balls arced over the entire stage to come down, each ball exactly where one of the other jugglers stood.

Two hands

Multiplexes can of course be thrown out of both hands, or a multiplex out of one hand, and a single throw out of the other.
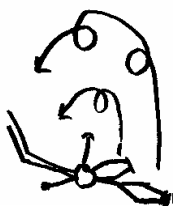
Clubs

The basic methods to throw club duplexes
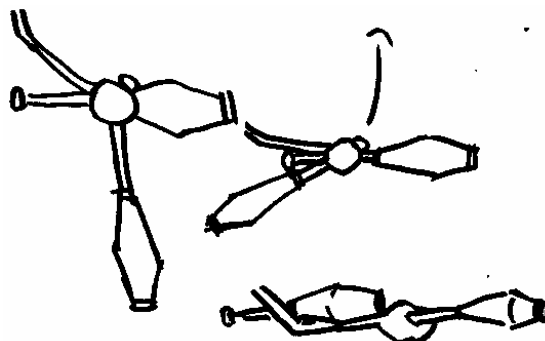
are explained higher, but try to experiment yourself. Hold the clubs in every possible way, throw and see what it gives. Throw from behind the back, with crossed arms,....
Always hold the clubs firm and release at once.
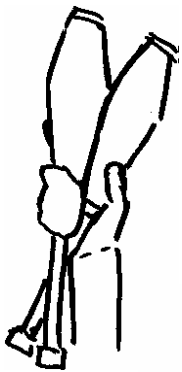
Synchronous duplex

This is an easy, but already spectacular start. Mark sure that the bodies o the clubs or on the same height when you release the clubs. The easiest way to do so, is by laying the club you hold with the thumb under the other (circus-catch). S this, collisions shouldn't arise. Try simples and doubles.

Synchronous triplex

Once you can do previous exercise, ad a third club under the two others and try this triplex start.
I like this one best if you continue with a synchronous pattern, as columns ([44] [4x0]).
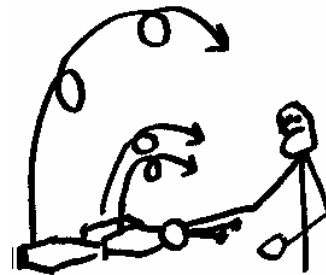
Asynchronous triplex

I like this triplex a lot as the three clubs drop asynchronous, having spinned ones, twice and three times. To make the high club spin three times, let everything spin fast, and catch the simple high, as it would spin to much if you let
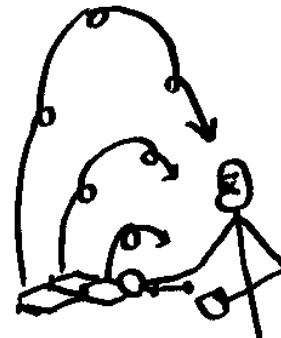
One line triplex

But this one is even better. Gaspar starts his four club open shower and his five club cascade as this.

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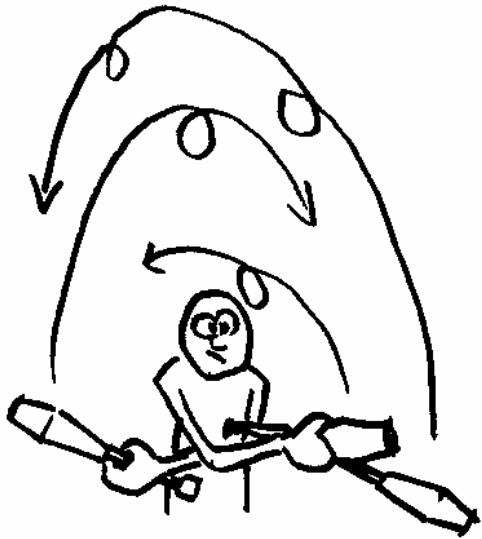
illustration.

Two hands

Multiplexes get even more spectacular if you use both hands. Arms can be crossed as in the

Patterns

Here I'll just list some classic ones (and a few more of course, you know me). The freedom is so big with multiplexes that you should find ten times more patterns if you search. Searching theoretically on paper is very useful, but trying while juggling will work too. As always, the more props, the less you'll find while juggling, as it gets too difficult. And the best is to combine both methods.

If you search patterns, try to play a lot with crossing 4's (straight 3's or 5's) caught with a crossed arm and mixtures with the styles explained in the following chapter (Mill's mess f.e.). Some patterns look very complex on first (and second) sight. I can't help it either. Just try to understand them, and most important of all, try to juggle them. It's sometimes much easier to juggle them than to understand them completely. The first patterns however are all very simple.

Nice multiplex patterns with **three props** are rare, however multiplex moves, stops and starts are endless and really interesting. To search them, first learn the easy patterns in this chapter, and then just play with three balls. Catch a second ball in one hand, and try a multiplex variation as a back catch or reverse dip or whatever.

If you juggle **more than three balls**, multiplex patterns become very interesting, and starts and stops stay very important too.

Couple patterns

Patterns based on the three ball cascade

4 One extra ball : (3,3) 3 3 O=7 !=30

LM:1, LP: the three ball cascade very fast and (3,3) 0 0.

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Hold two props in each hand. Throw 3 (3,3) 3. Catch the lowest ball as high as possible (as always in the palm, of your hand), then move downwards with your hand to catch the second ball (as always in your fingers). Try to reduce the height difference with techniques explained above.

Variations

Try to search for patterns in which the couple does something strange or is always thrown to the same height. Examples are:

4 2 (3,3); 5 (3,3) 1; (3,3) (1,1); 4 4 (1,1) (3,3); (5,5) 2 2 3 1 and **5 3 1 (3,3)**

5 Two extra balls : (3,3) (3,3) 3 *O=15 !=50*

LM1, LP: (3,3) 3 3
Variations
Try to search for patterns in which the not-couple ball stays on the same height. Examples are the same as written above.

6 Double cascade : 33 33 33 *O=30 !=75*

LP: 33 33 3
This is a furious little bastard. It's quite a lot harder than the 33 33 3, but it's so much more fun to do.

Variations
There is little good stuff possible, just try to emphasis the speed of the pattern. If you master the S six ball fountain, you can go from this one into it by throwing 33 33 4x4 5x5 6x6 [6 6] [6 6]... To avoid collisions, split the linking throws very wide by moving up a finger between the balls when throwing.

Patterns based on the four ball fountain

The concept is completely similar to the cascade patterns. And so it is for the five ball cascade.

*6 [(4,4) 4]** *O=40*

This is without any doubt the most interesting one.
There's a little secret to it. When you throw, you will normally throw the multiplex a bit less high than the single ball. It's natural to correct that by throwing a bit higher with that hand the next throw, but the next throw it is that hand that throws the single, so the problems will only enlarge. So always think of throwing the multiplex a bit higher, then it will be on the height of the single.

Hints as these may look extremely evident to jugglers that have never tried this pattern before. But I can assure you, I've seen this mistake by almost everyone that tried it. The answer is so simple if you read it, but if you juggle it you're always busy solving problems so that there isn't any time left to think what may cause them.

Variation
If you throw it higher and higher, you can go fluently into six balls asynchronous.

Other couple patterns

Of course, you don't have to base you on basic patterns, what about these patterns :
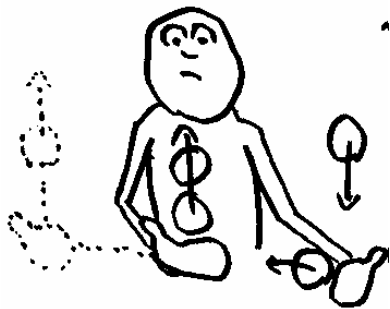
4 [4 2][2x (4x,4x)][2x 4]*, a four ball double box O=17

LP: The double box (chapter 9)
Throw the 4x4x straight up as it was a 44. Move both hands so that the 4x4x drops in the hand opposite to the one that threw it (as in The double box).

4 [(4x,4x) 2x][2 4x], barrage between the couple O=30

First do the pattern normal, without the barrage. Then try to move inwards just after throwing the 4x4x couple, so that you catch the 2x in the centre. Move on with your arm and barrage around the 4x4x, back to its normal place. On the same moment, with the other hand, throw the 4x. To avoid collisions cross the arm under, and throw to the extreme outside.

Ones you can that, it comes really interesting. Don't reduce the height difference between the coupled balls, and barrage between them.

5 [(4,4) (4,4)] [4x 0]*, column pattern O=40 !=50

It gets a lot easier and more beautiful if you throw the single 4x very high. Then the multiplexes don't have to stay close together. You end up in something like:
[(6,4) (6,4)] [6x 0][2 2]* (synchronous volcano).

5 [(4,4) 2x]*, five ball box O=40

I guess little explanation is needed.

Variation

A very nice variation on this one, but extremely hard to master is Luke's shuffle, shuffling between the couple.

6 6 (4,4) (2,2), a six ball pattern O=50

LP: 44 4 4 4, 44 44 4 4, 6 4 2, 6 0 44 0 22 and 6 44 2 6 4 22
As the couple 4 becomes a couple 2 after catching, it's an easy pattern.

Fork patterns

The fork exchange [(2x,2)2], a pattern

Hold one ball on the fork, the other two in the hands. Hold the hand that doesn't has the fork with it's back upward, ready to catch a fork. With the hand that holds

the fork, throw the normal ball towards the other hand fork, while you let the fork ball drop of on the outside. Catch both balls, the fork ball normal, the other ball on the fork of the opposite hand. No do the same thing on the other side.

Elevator variation
Don't throw with the fork hand, instead move gently up and lay the normal ball on the other fork. Leave it there and roll the ball into your hand palm. It's nice if you use the windscreen wiper (see further) to do so.

Box fork variation
This fork trick looks a bit like the box, if you do it nicely vertical.

Do the same, but hold the not-fork hand with its back downwards. Then throw the fork as in the fork exchange but the normal ball towards the other hand instead of to the other fork. With the other hand throw the ball straight up synchronously catch the ball coming from the other side in the hand and its own ball on the fork.

Other patterns (including catch-pauses)

Asynchronous multiplex patterns

As mentioned higher multiplex patterns are very useful if you juggle a lot of objects. With three props they are useful too, but you should search more on where you catch and throw how the arms move, and weave the fluent things you find into a routine, instead of juggling the one pattern after the other.

This is generally true for three props, but even more in multiplex juggling. The problem is: I can't give you those flashy things, it's up to you. However what I can give you are some patterns which can help to learn you feel what is possible.

In what follows, I have mainly explained 4 prop patterns. Those jugglers experienced enough to work on five prop patterns can search on them selves.

(4,3) patterns

3 43 0 3 2 3 O=4 !=15

Start with juggling the three ball cascade. Then, instead of throwing, do a weave and catch a second ball into that hand as explained in stops. Continue throwing a 3 with the other hand. Then the pattern can start.

Throw the (4,3) multiplex, then with the same hand catch and throw the incoming balls to the other hand. Just after throwing the last ball, your other hand throws the (4,3) and the pattern starts on the other side.

Variations

On the zero, the empty hand can move to the other side, on the pauses it can move back. This makes some variations possible.

1) Throw the (4,3) straight up as it was a (4,4). Move, catch and go back.
2) Throw the (4,3) straight up as it was a (4,4). Move, catch and barrage around the 4 to go back. It's hard to do the barrage fast and fluent enough, but it's possible. To learn this variation, you can ad a 4 2 after the zero (this gives 43 0 4 2 3 2 3).
3) Throw the (4,3) as it was a (4x,4). With the other arm move upwards and over the 4x4, to catch the most outward ball. As you catch it high, you catch it earlier than the other ball, which is the real 4.
   Then barrage back to catch the reverse thrown 3.

3 43 1 4 2 1 O=6 !=20

If you do multiplexes when juggling three balls, and you don't want zero's, you'll need to throw a lot of ones. Here's such a pattern.

Variations and similar patterns

1) Throw the 43 straight up as it was a 44 couple, but low. Snap and move on to the other side to catch the 3. Going straight back with the hand looks stupid. Instead move on and orbit around the 4. Try to move the hand downwards to its place only when the last one has been thrown, so that the hand comes down just when the snap arrives.
2) The pattern looks good done in Mills Mess (see chapter 14). Both cacab and cabbb styles look good. (See chapter 14; multiplexes and Mills Mess).
3) Similar patterns are: 43 1 5 2 1 and 43 1 4 3 3 4 2 1. Both are very nice, when done in MM. (cabbb and bbbcabb style).

That's all for three ball jugglers, for the others, this was only a warming up.

4 43 2 3 *O=8 !=35*

LP: 43 2 4 22 3
This is the basic four ball ASS multiplex pattern.

Variations
1) If you throw the 43 as it was a 44, and move to the other side to catch the 3, it looks a bit different. This variation can be expand into a peaceful barrage by changing the pattern into the **43 2 4 22 3** pattern. So just throw ones more a 4. (SEE more chapter
2) 43 2 3 barrage (barraging the 4 here instead of the 3 as done in the previous variation). See more chapter 13.
3) Mills Mess a and b look nice. See more chapter 13: Multiplexes and Mills Mess.
4) similar pattern is **43 4 4 2 3**
5) I like to switch into 723 out of 43 2 3. Throw … 42(3,3) 72(3,2) 723 … This variation is especially nice the 4's are thrown very high, and most important if the 2 is used as a weave both in the 42(3,3) as in the 723. It looks hard, but the 723 weave really isn't much harder than the normal 723.

4 43 5 5 2 1 *O=15*

It's nice if you throw the second 5 higher than the fist one.

Variation
1) Mills mess 43 5 5 2 1 a looks nice.

43 4 5 2 2 *O=15*

This one looks nice if the 43 is thrown straight up in the middle and the 4 and 5 reverse towards the middle.

Variations
1) A **Boston Barrage** (chapter 13) effect can be created. Throw the 43 straight up quite low, next to it the 4, a bit higher. Then cross your arm far under the other arm to throw a high straight up 5 on the outside. Collect the incoming balls, and do the same on the other side.
2) Change the pattern into **43 45 5 2 2**, and do the same with **five balls**.

(5,3)

Throwing a 53 is a lot harder than a 43 or a 54, because of the needed height difference between the 5 and the 3. It's always a struggle to throw it, but there are some patterns in which a close to each other flying 53 can be corrected. They are explained in the two following patterns.

3 53 1 2 1, a shower *O=8 !=20*

The first solution to a too small height difference is very simple: take a very fast pattern so that the little height difference is enough.

4 53 2 2 *O=20*

If you clawcatch the 3 when it peaks, it has only flown half its way. That makes you catch it earlier, and you can throw it a bit earlier.
It works, but it stays fast.

5 2 5 53 and 2 5 2 5 543 *O=20*

If you master the five ball cascade, this can be pleasant variations.
Juggle the five ball cascade, then, stop throwing ones, instead catch a second ball in that hand and throw a 53 to get back into the normal cascade. If you stop twice you can go for the (5,4,3) to go back into the cascade.

(5,4)

This gets hard to find something with three balls (I've found two). With 4 or 5 in contrary, there are a lot of possibilities. I'll only give you a few.

3 54 1 5 0 2 2 2, easy (5,4) pattern *O=6*

It looks stupid if you see it written down, but it isn't if you juggle it as this:
Throw low 54, then snap and throw a low reverse 5. Catch the 4 and barrage around both the 5's. Catch the five in the other hand and throw a 54 just when the barrage is done.

3 54 1 4 0 4 2 1, another easy (5,4) pattern *O=8*

Throw the five straight up, a little to the outside. Catch it by crossing your arm under the other arm. Throw the 54 low, so that the 5 is as high as the following 4's.
Throwing a 54 as this is quite doable with **clubs.**

54 1 4 0 3 2 2 is a similar pattern.

4 54 2 1 *O=12 !=40*

Just try it.
It's possible too do it with clubs, and beautiful in reverse dip. (If I write possible, I don't mean easy)
Variations
  1) You can throw 54 straight up and catch the five with a crossed arm.
  2) It looks nice if you juggle it very wide and low
  3) The switch from 54 2 1 to 741 reverse looks very well. If you throw the 54 2 1 high, and start the reverse 741 low, then the two patterns look so much alike that it looks as if the multiplex vanishes while the pattern stays the same.

4 54 5 1 2 3 *O=15 !=40*

This one looks nice if you throw the 54 as a 55 couple, and throw the next 5 between them. It can look very spectacular if you do this pattern very low and wide.

Fig 54 5 1 2 3

4 *54 2 4 2 3* O=15 !=41

This boring pattern can become a lot more interesting if you throw the 5 a little to the outside instead of crossing to the other side. After throwing the multiplex like that, make a weave with the other hand (first pause), and after the weave, move on with the arm to wards the other side, cross under the other arm and catch the 5. Then do the same on the other side.

With **clubs**, throwing the 54 as explained here is a lot easier than the normal 54, juggling the pattern however isn't easy. But I'm sure there are a lot of other patterns possible with a straight up 54. **54 1 4 2 4** is such one. If you search easier go for the 54 1 4 0 4 2 1, explained higher.

4 *54 2 4, the basic five prop AS multiplex pattern* O=30

LP: 54 2 4 2 3, 54 22 2

If you have problems splitting the 54, you can throw it reverse. Of course it looks a lot better if you don't, and it's realy not such a big task to let them split nicely (see techniques earlier in this chapter).

With clubs, do it in simple-double. It is a hell a lot easier if you do 54 22 4, cause then in the 22 pause, you can change the place of the two clubs in your hand a bit, so you can throw a nice multiplex. Only when this pattern works smoothly go for 54 2 4.

Variations and similar patterns (balls)

1) With six balls you can do 54 2 7. But the following patterns are better.
2) For those who like to juggle as much balls as possible, it's interesting to know that you can adjust the pattern easily for other numbers of balls.
   4 balls 43 2 3
   5 balls 54 2 4
   6 balls 65 2 5
   7 balls 76 2 7
   ...
   I've seen *Anthony Gatho* juggling the 76 2 6 without any problem.

(6,4) and (7,5)

Throwing stilps that differ two heights is hard to do. Do everything you can to enlarge the height difference between the balls (techniques are explained in the theory above).

5 *(6,4) 6 1 2 1* O=35

On the other hand some patterns can work even if the 64 doesn't splits enough. In this pattern the 4 becomes a 1 after catching. As a 1 requires little time to throw, there's little time needed between the 4 and the 6.

To juggle it, it's easiest if you throw the 64 low and the other 6 a bit higher. You'll feel that the pattern can be done really low.
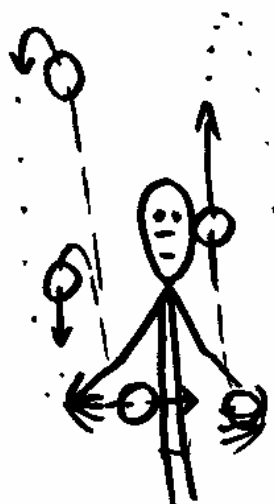
Variation

1) If you juggle the 64 6 1 2 1, it's nice to switch into the 54 5 1 2 3 like this. Switch after a completed 64 6 1 2 1 pattern. Throw the 54 up as you throw up just the same as

you were throwing the 64's. (that is straight up and low). Then instead of throwing the 6, throw a 5 crossing between the 54, towards the extreme other side. To avoid collisions, it can help if you throw the 54 a little to the inside. Then move up a bit towards you have thrown the 5. Do the 1 2 3. Normally, when doing the 2, your hand should be under the dropping 4, and one count later, your other hand should be under the dropping 5 (same place) as you are moving under your balls.

2) With five balls some similar patterns are:
64 6 1 22 4, 64 6 3 2 4 and **64 6 5 2 1**

4 *75 1 2 1* O=15 !=30

This is another pattern in which the lowest height becomes a 1 after catching it.

Variations and similar patterns
1) In 75 1 7 1 2 1 the 75 is always thrown with a different pair of props.
2) If you like to juggle a lot of props go for 5 (9,7)121, and 6 (11,9)121. Especially the (9,7)121 has a cool rhythm as the 97 is always done with a different pair of balls.

97 1 2 1

(6,5), (7,6), (8,7); High multiplexes

To juggle lots of balls, you'll need high multiplexes. A 65 multiplex for example results in a site swap height 11, what makes that the mean of the other two heights in a three count seven ball pattern only needs to be 5. Which means 5 and 5 or 6 and 4 or 7 and 3 or ... So, it looks as if multiplex will make un endless number of patterns possible with 6, 7 and 8 balls.

However, this isn't really true. A multiplex always needs a pause to get two props in one hand, so that the mean height of both the multiplex and the pause is: (6 +5 +2) / 2 = 6,5, wich means that the other throw in the pattern will need to be more than seven (an eight to be precise).

So in other words the only 7 prop, three count pattern with 65 in it is 65 2 8, which is an extremely hard one. So, high multiplexes aren't really a heavenly gift to juggle lots of balls.

Anyway, here are some patterns:

4: 2 3 65 3 1, 2 4 65 1 2, 2 5 65 1 1

5: 2 2 65, 2 3 65 3 6, 2 4 65 6 2, 2 4 65 3 5, 2 4 74 4 4, 2 4 65 1 7, 2 5 65 2 5,
     2 5 65 6 1, 2 5 65 1 6, 2 3 64

6: 2 5 65, 2 5 65 6 6, 2 3 76, 2 1 76 7 7, 2 4 76 4 7, 2 5 76 4 6, 2 5 76 7 3,
     2 6 76 3 6, 2 1 87

61: 2 8 65, 2 6 76, 2 6 76 7 7, 2 9 76 4 7, 2 4 87, 2 6 87 8 4, 2 2 87 8 8,
     2 1 87 8 9, 2 6 87 5 7

6 2: 2 7 87

Some triplex patterns
3:       2 3 22 0 543 0 0
4:       2 3 22 2 543 2 0
5:       2 4 22 3 543, 2 4 22 3 654 2, 2 4 22 3 765 3 1, 2 4 22 3 987 3 1 3 1,
2 5 22 2 543, ...

Multiplex combinations

If you do two multiplexes after each other in one pattern, the second multiplex will need to be higher than the first one because otherwise the props would drop on the same moment. Further, to get two balls in each hand, there will be two consecutive pauses needed. That will make all those patterns have a stop and then an outburst of balls. I've written some nice ones under. They are all nice in a a-form Mills Mess too.
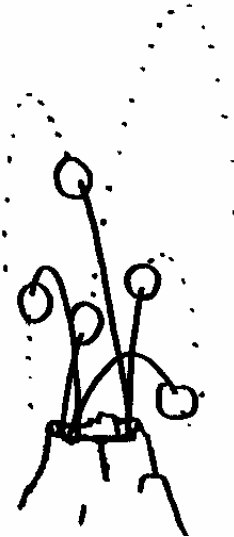
5 *43 54 5 2 2, the basic Vesuvius* O=30

If you throw the last five very high, this pattern looks as a volcano outburst.

Other patterns are:
5 34 54 55 2 2 (quite hard)
5 54 65 1 2 2
6 54 65 6 2 2 (again, throw the last 6 high to get a volcano effect)
6 54 76 4 2 2

Holding multiplexes (32, 42, 52, 62,...)

If you hold to balls, you can throw only one up, holding the other in your hand as a pause. I don't like them.

5 *62 2 5, Martin's* O=20

This is a classic one. Just try it, high 6's stabilise the hole thing.
You can try **72 2 4** as a variation.

Synchronous multiplex patterns

I guess there's less possible with synchronous multiplex than with asynchronous. It's not because Synchronous site swap would be less powerful, but it's because if the multiplexes is up to the same height, half of the patterns are couple patterns, and if they are up to different heights, they must differ two heights, which is hard to throw.
The high multiplexes as 6x6 or 8x8 normally don't split enough, and the 6x4 and so are a lot harder than the 54.
For **clubs** however, the multiplexes to the same height (4x4, 6x6) are a lot easier than the 54 or 43.
With three props, again the same story, with three balls don't search for multiplex patterns, search for starts and stops.
However, there are some neat tricks possible, using only height 2.

3 *Trains (balls, best big ones)*

Train tricks could be placed between contact juggling, cigarboxes, and normal juggling. The different variations possible should be combined as much as possible, going from really simple to quite complex. You'll understand me best by trying it ones.

Illustration trains

Hold your balls as drawn. Pop them up towards the right so that the two left balls drop in your right hand, and the right ball falls out of it. You can catch that ball up with your left arm under or over your right hand as you which, but make sure that your hand is on time so that the three balls stay on the same height. Move your left hand back to it's side by a gentle move. You can now do the mirror pattern, or again the same one.
This trick looks like shit if the balls all pop up to a different height, but it if they stay really low, close to each other and on the same height it looks really funny.

Variations
-You can pop them a bit further so that two balls fall over a hand
-You can cross your left arm under (or over), but move your right hand, so that the left gets back on it's place.
-You can stay crossed with the hands and pop the balls back to get uncrossed.
-Left can move back to it's place and move on back crossed from over to under or otherwise.
-Ones crossed, you can pop the balls back, cross your hands over otherwise and catch again.
-You can ad some really easy contact moves. (rolling balls over your hand, around each other).
…

4 [4x4 2x][4x 0][2 2], a barrage O=25*

Throw the 4x4 as it was a 4x4x. With the same hand throw the 4x, and then move upwards an to catch the highest of the two 4's, thrown to the other side. Barrage it back. End the barrage by snapping the next 2x.
I won't say that this is a fantastic trick, but such a snap towards the hand that throws a multiplex is a useful move to master. It can put you on ideas.
A similar pattern is [4x4 2x][4x 0][2 4x][2x 2]*.

4 [4x4 2][4x 2] O=8 !=35*

LP: [4x4 2][4 2][4x 2]*
It looks best if you split the 4x4 wide, and throw the 4x between it.
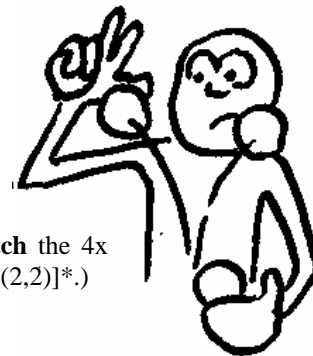
Variations and similar patterns
1) On the first pause (2), move up with the hand and **clawcatch** the 4x when he peaks. (Actually you're now doing the pattern: [42x][4x (2,2)]*.)
2) Try this pattern: [4x4 2x][4 2]*

4 [2x4 2x][4 22][4 22] barrage O=15*

Throw the 2x4 as it was a 4x4, out of the centre. With the other hand, after snapping the 2x, catch and move up towards the other side (under the 4x4), and catch the 4 on the other side when it peaks. As it has only flown half it's way, you've caught a 2x. Barrage the two balls in the hand back, while the other hand does two in one hand until your ready to do it on the other side.

Some other four prop duplex patterns are:
[(4x4) 2][2x4]*, [(6x6) 0][2x2]*, [(4x4) 2][6x4x][2x2]* and [(6 4) 2x][6 2][2x 2]*

5 [4x4 2]* *O=20*

This is the basic five prop multiplex pattern. It's not hard at all, try it. If you have collision problems, split the balls some more as explained in the theory. If that doesn't works, you can throw the 4x4 reverse, towards the centre.

5 *Other five prop duplex patterns*

[6x4x 2][6x 2]*, [6x4 2x][6x 2]*, [6x4 4][4 2]*, [6x6 4x][2 2]*, and [6x6 4][2x 2]*

6 [6x4x 2]*

The 6x4x in this pattern is really easy, cause after catching the 4x, you have a pause, waiting for the 6x to drop. (this is the slow version of 33 33 33)

6 [6x6 4x][6 2]* and [6x6 4][6x 2]*

Try them. You'll see that the 6x6 is hard.

4x4x4 triplex patterns

4 [4x4x4 0][4x 0][4x 22]*
5 [4x4x4 2][4x 2]*
6 [4x44 22][4x 22]*, [4x4x4 6][4 2]*, [4x4x4 6x][4 2]* and [4x44 6x][4x 6x][4x4x 6x][4x 2]*
The last one looks devilish, but it's not that hard to remember at all. It's always 4x's in the one hand (multiplex if you hold more than one), and 6's in the other hand. Just juggle it, you'll see if it works for you.
61 [4x44 2]*: A classic but hard pattern.

61 [6x6 2]*

Although the 4x4 2 pattern is known by many jugglers, the 6x6 is known by very little. The main problem is collisions. And as always, the solution is splitting wider.

Chapter 7: **Rebound**

What's rebound juggling

Rebound is a juggling method in which balls bounce on the floor before they are caught. Bouncing a club is possible too, but only as a trick, not in continuous patterns. The technique to bounce club is explained in chapter 1. Here I discuss ball rebound.
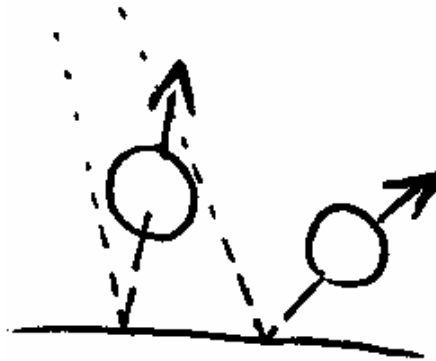
Training rebound

Although there are easy patterns, I advise you to work with normal balls first. The level on which rebound juggling becomes really interesting, make rebound juggling a hell a lot more interesting for experienced jugglers than for beginners.
Further, it can be hard to find a suitable practising place, as rebound juggling requires a stable and smooth floor, and makes a lot of noise. You can solve this problem by gluing a carpet under a marble plate. Such a marble plate is sufficiently stable on most surfaces, even on grass. Bouncing-noise can become music, if you work on it. (of course, the chance that your neighbours will see it that way is rather small.)

Training on a plate diminishes the possibilities to use the space a lot. Even if you have a perfect floor to practice, so that you don't need a marble plate, you can't expect the same on stage.
You can find really nice stuff by adding vertical and inclined planes. *Micheal Moschen*, one of the fathers of modern juggling, made a rebound routine in which he stands in a big metal triangle, using the three sides of it producing astonishing rhythmical and visual patterns.

In this chapter I won't explain box stuff. Generally spoken, train until you are a good rebound juggler (whatever that may be for you), and only then start to experiment with boxes, otherwise you'll lose a lot of time.

Good rebound "boxes" can be made with wooden MDF-plates, the heavier the better.
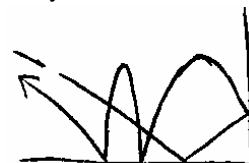
One of the main problems when practising rebound, is the fact that they keep on bouncing and rolling in every direction, when your pattern crashes. After a while it gets really boring to keep running after balls, and searching for them. Some guidelines:

First catch the balls around you, before they also collide and roll away, and then look where the others are heading to before running after one of them, ending up searching hours to find the others.
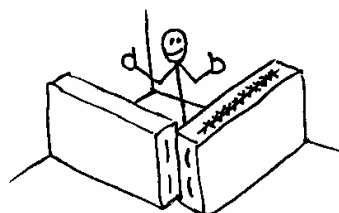
Never practise close to a river, highway or canyon. Try to build a "cage" around you when practising. In gyms for example, you can do so using acrobatic carpets. This keeps everything together when it drops.

On the other hand you can reduce the "searching time", by training a lot on learning patterns before going to the real pattern. Snakes for example are really interesting to learn five or seven. (I mean it, do it !)

Technique

Position

Stand straight up, relaxed, don't bend forwards. Especially when training active, keep standing straight up.

Juggling lower to the ground (on your knee's) can make wide patterns easier to keep thin (five double bounce). Usually it's used to train on speed, or just as a variation.

A larger distance won't make the rhythm much slower, because the balls won't bounce up high enough anymore. Therefore they have to be caught when they peak, and you lose the time between peaking and a passive catch. Sometimes even peaking-catch becomes impossible. Then the only solution is throwing active, which again reduces the air-time.
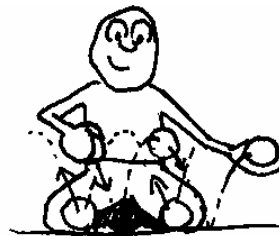
Passive-active

When throwing a rebound ball, you can throw a little upwards or directly downwards. In the first option, the ball will peak before descending. Although it may go up only a tiny little bit, the ball will fly a lot longer than if you throw directly to the floor, this because when peaking, the ball flies really slow. Throwing a little bit up is called a passive throw, the opposite is an active throw.

When caching, the same options exist. Catching when the ball is still going up is called active, when it's already going down again passive. There's less speed difference between these two options than in the previous case because the balls usually peak on the height of your hands. Catching when peaking is considered passive. However when throwing high (as in some site swap's) the difference will be really big. It can make the difference between a 7 and a 5 f.e.

This gives us 4 possibilities, from slow to fast: Passive throw-passive catch (PP), Passive throw-active catch (PA), Active throw-passive catch (AP), and Active throw-Active Catch (AA).

Double and triple bounce

If you let a ball bounce a second time before catching it, it will of course stay even longer "in the air". Triple is about the maximum, as the height diminishes every bounce.

185
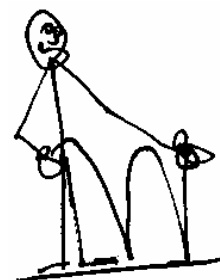
Tapping

If you tap an upcoming ball to the floor, instead of catching it, and then throwing it to the floor, the ball will start earlier and therefor return earlier. As that, you can do fast 2's in slow patterns.
Tapping with your foot is possible to, but not easy, not at all.

Illustration 12.11

Special effect

If a ball spins when it bounces, it will bounce strangely.
The fastest and most spectacular way to do so is this: you need to flip the ball between thumb and ringfinger. It's possible in both directions.

llustr.**12.9**

A method for throws that need more precision, and less spin, is letting the ball roll out of your hand when throwing. Especially for bounces behind you this can be interesting.

llustr 12.10

Antonio Bucci, juggles the four ball cascade, throwing every ball over his shoulder so that it bounces behind him, and drops back over his shoulder into his hand.

Rebound site swap heights

Combinations of fast and slow make rebound juggling really interesting. On the one hand, the little throws needed can be done very fast, and on the other hand, a (double) bounced ball stays a long time "in the air". This makes extreme patterns, as 10 5 5 5 5 0, very doable and also means that you have an large freedom pace.
Every pace requires another set of throws to do a certain height, which makes site swap in rebound juggling less transparent than in air juggling. A height 5 in air juggling, is a 5. It's as clear as that. But in rebound, depending of the pace, a 5 can be just about everything, from furious active throw-active catch to a lazy double bounce passive throw, passive catch.

The following table shows for every pace, the matching set of throws for the set of heights. (abbreviations see below) It's always possible to do high heights by throwing high PP's instead of the suggested double bounces.

Height	**Very slow**	**Slow**	**Normal**	**Fast**	*Very fast*
2	AA	Tap	Pause	Pause	Pause
3	*PP*	AP	Air	Air	Air
4	PPD	**PP**	AA or AP	AA	Fast AA
5	PPT	APD	*PP*	AP	AA
6		PPD	Higher PP	*PP*	AP
7		High PPD	High PP	Higher PP	*PP*

8			APD	High PP	Higher PP
9			PPD	APD	High PP
10			High PPD	PPD	APD

AA = Active throw, active catch
APD = Active throw, passive catch, double bounce
High PPT = High passive throw, passive catch, triple bounce
Air = Air throw, not bouncing

Examples of patterns

Site swap patterns usually include high and low throws. The high throws don't need to be the problem, as you can go for double bounce. However the low throws are very hard, and therefore normally done as air-throws, which results in partial rebound.

If you want to do the low throws bounced to, you can do active throw and active catch. Or, you can slow down the rhythm by doing the other heights in double bounce (as the perfect combination; double 6 simple 4).

Three balls *O=1*

Complete rebound with three balls is generally too slow to be interesting, although that slowness can of course be interesting too. A very nice **variation** is throwing active from behind you, through the legs, catching in front of you. This looks best with stretched arms.

3 Cross catch double bounce columns

O=3

It may sound strange to do the extremely slow three ball cascade in double bounce, but this patterns looks really nice, and makes some simple movement variations possible.

Make an active column throw, when peaking do the same on the other side, after throwing over there, cross your arm and catch active on the other side, under the next ball that is thrown. Continue this pattern.

3 Cross throw double bounce columns *O=4*

You can also throw with a crossed arm, and catch uncrossed.

3 Pirouette threw double bounce columns *O=10*

If you master these patterns, you can spin 180 degree's through the pattern. Start moving as soon as you let a ball drop, catch while moving.

After spinning, continue. You'll see that you now have to do the opposite, instead of cross catch, cross-throw (or the other way around).

3 **531** *O=5*

Passive 5, low reverse 3, and a 1. At first it's hard not to catch the five before it bounces, but once it works, it's really fun.

If you like this one, you can try the 441 with active 4's. It's easiest to juggle the 4's in four columns, with the first 4 on the outside.

3 **51** *O=7*

Active 5. You can combine it with air 5's.(see →)

3 **7131** *O=9*

Juggle a very low shower, don't catch the first ball, do catch the second, don't catch the third one, instead catch the first one as it's peaking on that moment, continue this sequence

3 60, Three in one hand in Columns *O=25*

Throw straight up, on two lines. Active catch under the ball you've just thrown.

Try to swing your arm wide and fluent, but let the balls drop vertical so that everything stays thin.

3 8040, partial rebound three in one hand *O=20*

Juggle it in three columns, with a high passive 8 and an air-4. Throw the eight on the same height as the four.
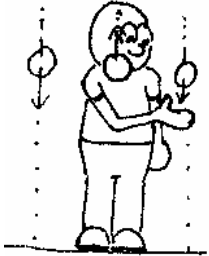
3 4x2* with bounced 2 *O=15*

If you throw a passive 4x and a fast active early catch 2, you use both methods to make the pattern possible.
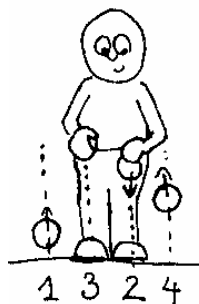
Four balls

4 Four ball fountain *O=20*

Columns and active catches are the most used pattern, because otherwise the rhythm gets too slow.

4 534 and 53 *O=40,15*

Five passive, 4 active, 3 reverse air   throw.

4 633 and 83333 *O=9*

Throw high passive bounces for the 6's and air 3's.

4 6x2x, the four ball shower *O=30*

The 6x is normally done passive, and the 2x snapped under it. It's also possible with active 6x's.

4 6x2x* *O=30*

This one I like really much. I do it with passive 6x's.
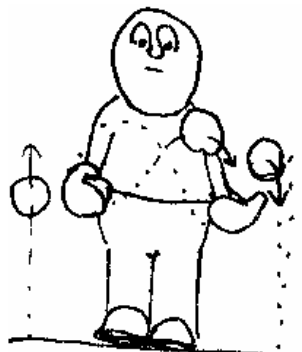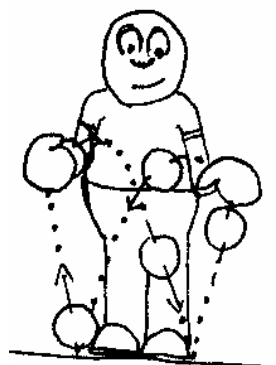
Five balls

5 Five ball passive cascade: passive throws, passive catches *O=18*

This is the easiest way to juggle five balls, throws are very low, reverse cascade throws when they peak (after bouncing of course). The balls cross before they bounce.

To practise it, the snake (50505), is most suitable.
Collisions are avoided by crossing wide.
Once you get the pattern stable try to play with it. Do it small, high, wide, walking forwards, sideways, run around the pattern,... Further try pattern variations as 10 5 5 5 5 0, 9 5 5 5 1, with double bounces.

5 Five ball active cascade: Active throws, passive catches *O=35*

Throws on the outside of the pattern, the balls cross after bouncing. This technique is a lot harder, not in the least because it's a lot faster.

If you really wanna become a rebound juggler, you really need to go for this one. The snake is the best learning pattern again.
To reduce collisions hold your hands far from each other when throwing, and let them bounce quite close to each other. Try to look through the pattern, not only to the bounce-spot.
Don't be afraid. Train the snake (50505), the 552 and 55550. Keep the pace.
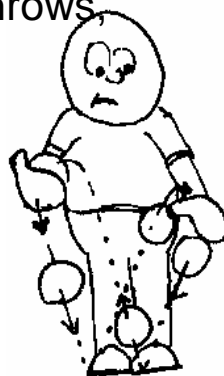
Vincent Bruel, one of the best rebound jugglers of the world, masters the five ball reverse active cascade (then the catches are active to). It's really marvelous to see his hands twisting around so fast. Look at Bouncing in Paris if you wanna see more of that.

5 Switching between active and passive

Going from passive to active is easiest. Throw from very wide, and as late as possible. To can throw the last passive throw a bit forward. **the first active throw avoid collisions, you**

5 Five ball double bounce reverse active cascade *O=30*

Yeah, I know, it's a long name. It's easiest to learn it standing, but it looks better if you do it low, sitting on your knees or so.
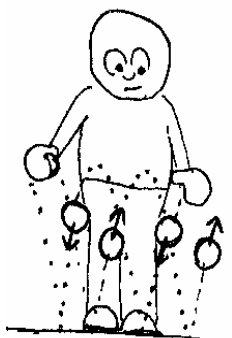
The rhythm you need is exactly the same as in an active three balls cascade, however now, instead of catching, throw on, and let the balls bounce again before catching. If you do so, the second bounce should be synchronously with the first bounce of the next throw (from the same hand).
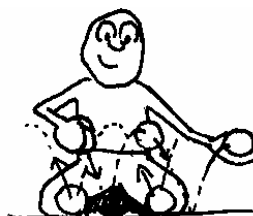
5 Switch to air juggling *O=45*

Out of passive, just start throwing air 5's. Throw high. The moment on wich you start looking up is crucial. The last bounce catches need to be done blind, so that you can see the first air catches just soon enough to catch them.

Out of active, you can do the same, but the following method is easier. Throw three times really hard to the floor, so that the balls bounce up high. Then throw the air throws from under the high bouncing balls.

5 Switch from air juggling *O=50*

Juggle five balls, and switch at once, try not to throw anymore, try to let them drop. The secret lays in the switch. The last air-throws have to keep the height of the previous ones. So concentrated more on these throws than on the first bouncers. Those first bouncers need to be as low as possible, but they may be more "wrong" than the air balls, because you have more time to correct bouncers than air balls.
Another way to switch is done by stopping to throw, letting the last three balls drop, and starting the passive cascade by three active catches. This is a fast switch and it's even faster if you make the last thows too low. So again, keep the height, and stop at once. (here you could throw the last ball a bit higher).

5 Five ball pirouette *O=50*

Juggle a very thin five passive cascasde. Instead of catching let them all bounce a second time. Make a pirouette in the empty hand time, catch and go on.

5 64x*, the five ball column pattern

O=10

Although it's a hard pattern in air-juggling, it's really easy in rebound. It's even easier than the basic five ball cascade.

To juggle it, throw two balls vertical, one on the very outside, one in the centre. Then move both hands, so that the "centre-hand" can throw on it's outside, and the other hand in the centre. When the first two balls peak, throw two others, and catch the centre ball with the hand in the centre, and move back to the starting position. Continue the same sequence.

From this moment on, there are always three balls bouncing synchronously, the one in the middle only bounces ones and changes hands.

To get it smoothly, you need to throw the 6 a bit higher than the 4x.
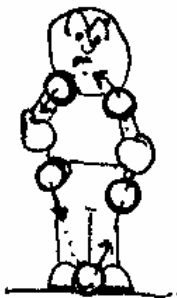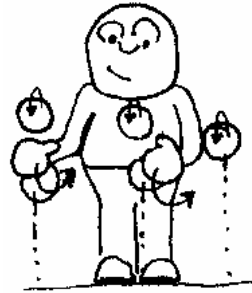
5 6x4x *O*=40

Passive 6x, air 4x is easiest, but active too. It's possible to do a 6 passive and a 4 passive bounce, but then it's collisions.
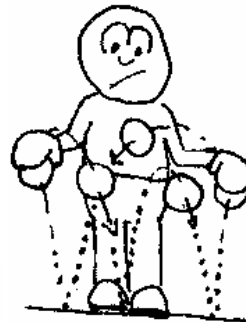
6x is possible double bounce hard to avoid

5 6x4* *O*=45

This is normally done with an active passive six
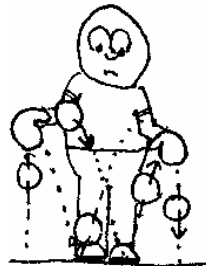
4 and a high

5 10 5 5 5 5 0 (and 10 5 0) *O*=25

Juggle the cascade, then throw one ball straight up on the outside (if things collide, it's because it wasn't thrown enough on the outside), a bit higher than the others, and continue the cascade. Five counts later, your other hand will stay empty, and if you continue, another five counts later that first hand will be able to catch the double bounced 10.

Mark that the same works for seven balls

When the 10 5 5 5 5 0 works smoothly on both sides, try 10 5 0 and the six ball 1055555

5 95551 *O*=27

Completely similar, however here, it's really hard not to catch the double-bounce 9 the first time it peaks, as it is crossed. (The 1 isn't bounced of course.)

5 8552, (6)852(4) and 88522 *O*=24

An active double bounce is a perfect 8. Try first to throw an 8552 while juggling a passive 5. If that works go for an 88522 (and 88531 or 88441). Then try the 852 high state pattern (start with the hand that holds two balls). Finally try the six ball 855.

5 933 *O*=30

I like it most with the nine as a high simple bounce. Make sure you don't give the 9 spin when throwing, otherwise, the pattern will go too wide. Too start I throw a 9, wait two counts, and then start 933 (starting with 944 is also possible).

5 74707 $o=44$

If you master the 72727, you can throw an active four on the first pause, followed by a zero, which makes it possible to catch the 4 active, and thereby fitting the fast pace of passive 7's.

Ill 12.37

5 55525(5,3)555… and (5,3)23 $o=25$

Juggle five, keep a ball in the hand, catch the incoming ball and throw a low couple throw. Catch the highest as a 3 and let the lowest bal bounce as a 5.

Illustration 12.38

5 (7,3)23 and (9,3)5521 $o=25$

For a (7,3) catch the lowest, bounce the highest one. For a (9,3) catch the highest and let the other one bounce twice. To get into the patterns out of the cascade use the linking throws: 723 and 95521.

Six balls

6 Passive synchronous cascade $o=40$?

This is done most. Keep the synchronous balls close to each other.

12.39

6 Active syncro cascade $o=55$?

It's done.

12.40

6 Passive four columns $o=50$?

This is a really beautiful pattern. Do the three in one hand in columns as explained above.

12.41

6 105555 and 855 $o=50$

Learn the 852, 8552 or 10 5 0 and 10 5 5 5 5 0 patterns, then try it.

Seven ($o=45$) or more balls

For seven, learning patterns are: low five, low six cascade, the snake (7070707), the flash (7777700), and other patterns with heights seven (771, 77771, 723, 72727, 74707 ...). Although passive is really fast already, some jugglers manage to do it active to.

12.42

If you wanna do more than 7, I won't be of much help.

Chapter 8:

Styles

What's a style

A style is a general way of arm movement applicable on every pattern involving the needed length and pauses. Generally spoken they are about the most beautiful patterns to juggle, and therefore very interesting to learn. Especially the fact that you can apply those movements on a lot of patterns ones you can do it with one pattern makes them even more worth the effort.

Most styles involve arm movements on pauses and require therefore patterns with pauses, other styles as Mill's mess don't need pauses and are therefore applicable on about every pattern.

Mill's mess

To juggle the basic three ball Mill's Mess, you don't need to read the following explanation. However, if you want to go a bit deeper, you should understand Mill's mess a bit better. If you do, you will see that Mill's Mess is not just a trick that you can do with three balls, but that it is a style applicable on almost every pattern, and that there are a hole bunch of other Messes possible beside of the basic Mills mess.

Understanding it fully

To understand what Mill's mess is, we need to understand what it is, and not how it is done. Once you understand what happens, you can deduce out of it what you will need to do, how you will need to do it.

The basic mill's mess is nothing more than throwing three times on one side of your body, followed by three throws on the other side. However the hands stay throwing alternating so they will need to crosss and uncross. (Mark that you can explain the MM on other ways to)

What happens can be summarised in a matrix, in which we add other information to the height:

Count:	a b c	a b c
Side:	L L L	R R R
Height:	3 3 3	3 3 3
Arm:	r l r	l r l

Mark: the counts, or different throws are indicated by a letter instead of a number to avoid confusion with the height.

Fig: positions MM1, MM2, MM3

How to do that is the next step:
a: As you can see in the illustrations, you start with an arm crossed over the other, you throw a reverse cascade throw continue the movement and thereby uncross.
b: The other arm makes a reverse cascade throw, continues the movement and crosses over to the other side to catch the first thrown ball..

c: The first arm makes a reverse cascade throw, crossed under the other arm, moves towards it's side and catches, still under the other arm the second thrown ball.
As the third ball comes down, the mirror image of this sequence starts.

It's a lot, I know, but you should already master the Mill's mess, this is just explaining what actually happens, because we'll need that knowledge lateron.
We can add the information to the matrix:

	Count:	a	b	c	a	b	c
What:	Side:	L	L	L	R	R	R
	Height:	3	3	3	3	3	3
	Arm:	r	l	r	l	r	l
How:	Position:	Co	N	Cu	Co	N	Cu
	Reverse?:	rev	rev	rev	rev	rev	rev
	Direction:	X	X	X	X	X	X

(Co= crossed over the other arm, Cu= crossed under the othe arm, X a cascade throw, as in the synchronous notation)

Please get to the point

Writing down such a matrix isn't really useful unless you want to program a computer, however what you can do with it is really interesting.
You can change bits of the "What" or "How" and thereby create variations on the Mill's mess.

Side: Are there other sequences possible ? LLRR, LLLRLRRRLR, LLL... ?
Height: Are there other heights possible ? 423, 534, 55514, 441, (4,3)23, 53,...
Arm: Can you juggle it with all four your arms ?
Position: Can't we change under to over-crossed ?
Reverse?: Can't we throw normal ?
Direction: Are straight up throws possible?

YES, it's all possible, and even all on the same time. It will result in hundreds of fluent or bizarre tricks of which some or explained below.

However first things first:

The basic Mill's Mess pattern

₃ Learning 3 ball mills mess   *O=8 !=15*

Mills Mess is a style in which the arms cross over and under each other. There's an animation of it on the right side.

1) Learn the arm movement with one ball

Do as illustrated. Mind that when you start the arm that holds the ball is crossed over, and that the other arm is normal, on its side.
Start where you ended, so with the oher arm. Continue this exercise until you don't have to think anymore.
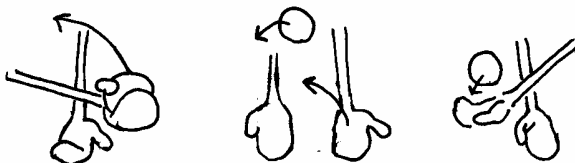
2) Learn the arm movement with two balls

Hold your arms in the same position, but now hold one ball in each hand. Throw just as before, while uncrossing the arms throw the second ball also crossing. Catch the first ball and move on with the arm so that it lays over the other arm when you stop (just the same as you did in step one). Catch the second ball in the empty arm under the other arm. If everything is done correct you end up in the mirror image of the start. Now do the same on the other side. Continue this exercise until you don't have to think about it anymore.

3) Throwing all three the balls

Hold two balls in the crossed arm. Throw the first two as explained higher. Before catching the second ball (the one you catch under the arm) throw the third straight up under the arm. If you stop here it's natural to catch that third ball in the hand that threw it, as you threw it straight up. However trey to catch it in the other hand by moving again to the other side cause this is what you will have to do to juggle the pattern continuously.
Try the same thing on the other side.

4) Juggling the pattern continuously

If you can do everything explained above, it should now be possible to juggle the pattern continuously. It can help if you throw the third ball a bit higher, so that you get a little pause before you have to do the pattern on the other side
It can also help to do this pattern with three balls of another colour. As it is a three count pattern and the heights are all 3's, every ball stays doing the same thing. So it's always the same ball that should go over, the same that …
Juggling mills mess with **three clubs** is surprisingly easy ones you can do it fluent with balls.

Improving Mills Mess 3

To make your three ball MM look better, juggle it faster and more fluently. Try to arc all three the balls on the same line. Therefore throw them all three out of the same position by crossing the arm far under to do the third throw. Throw them all three in a wide arc (so cross them a lot). Especially the third throw should be crossed a lot, and not vertical, so that it arcs all the way to the other side. You can make the arc extremely wide and move sideways with your body to keep it going. Let the pattern be full of life, love it.

Throw and catch variations

With **balls** there's not that much to do with throw and catch variations. Things like backcrosses or backcatches break the fast pace and the line.

3 Penguin O=30

Smaller variations as penguin catches however can be nice. The easiest penguin catch is the c throw. Throw it a bit less crossed and catch it penguin with the hand that makes the a throw. If you want to go further, it's possible with backhand catches too, and clawing every ball is possible too.

With **clubs**, there are a lot nice things possible.

3 Soleil (also called dip or flat) !=30

Try to change the spinning plane into the shoulder plane by throwing dip, reverse dip, dip. If you do so, the b throw will be hard to catch. Try to throw it close to your body, not over-spinned and concentrate most on catching that club.
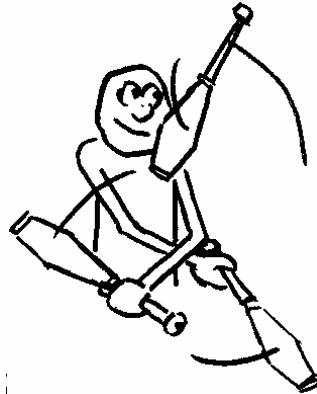
3 Behind the back !=50

Unlike with balls backcrosses and backcatches a very nice.
First try this one: Throw the b as a backcatch and catch it behind the back by throwing a backcross. Only the a throw stays normal. This is a hard variation, but it's worth the effort ! It's a bit easier if you throw everything high and slow (if you throw it more as a synchronous 4x2* pattern).
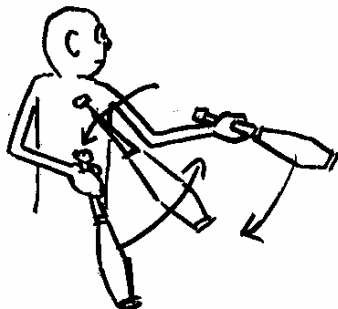
You can get it completely behind the back by throwing the a throw as a backcross too. Start with the backcatch. Try to slow it down as much as possible by throwing the first backcross (throw c) as late as possible. It will give you more time to do the a-backcross properly.
Some people throw the c-backcross under the armpit. It doesn't looks better if you ask me, and it's harder to do.
If you want to go even further with this, look for Rubenstein's Revenge behind the back.

Four or more prop Mill's Mess

As MM is just throwing three times on one side followed by three throws on the other side, it's possible to do it with four or five props too.

4 Learning four O=35 !=75

If you like to juggle **four ball** tricks, then the four ball MM must become your favourite. To learn it, take two balls of the same colour in each hand (lets say red in the left and blue right). As the pattern you throw is a style based on the basic four prop pattern, the red balls will always stay in your left hand, and the blue ones in your right.
Start as you do with three balls (arms crossed). Throw the first three balls, quite fast and as high as your normal four ball fountain (don't throw high, cause then you'll get the time to do catch with the wrong hand). Move your arms to the other side and throw the fourth ball to catch the first one. Then stop. Make sure that you catch the reds in the left hand.
If it feels awkward to you to move your arm to the other side while your still holding a ball or if you catch the balls before having thrown the fourth ball, then throw the first three a bit

higher. If that still doesn't helps you, start with a throw under the arm that would normally start. If you do so, you throw c a b c and you can switch side with an empty hand.

Try then to do the pattern continuous. Always keep the red balls in the left hand, the blue ones in the right.

Yet another way to start is by juggling the reverse fountain. If you do so, all the balls drop in the centre which is ideal to start the Mills Mess. If you don't master the reverse fountain then just do four reverse throws to start.

Once it works a few throws, pay attention to the following marks to get it fluent. First try to understand the pattern. If it's a cloud of balls, you'll never keep catching the right ones. Throw the a-throw crossed, but not too far, a bit over the centre. Then, even more important, make sure that the b-throw flies close to the a-throw. The c-throw doesn't has to fly that close. The more they are thrown on the same height, the better the rhythm will be. A low c-throw will speed everything up.

Four club MM is probably easiest and far more beautiful in simples. Both cold and warm starts are possible. I prefer throwing four reverse throws to start.

It is very hard to avoid collisions, but the following guidelines can help you out. Try to read only the first one, and train on it. Ones that works a bit, go to the next one.

1) The most important hint to keep it going is this: Throw quite high simples (although they don't need to be extremely high), but throw them in a fast pace, don't hold them in your hands as long as possible. Don't move towards a 6x2* synchronous pattern (binary juggling). You will need "empty-hand time". Try to throw as early as you can, try above all to keep the pace, throw to the same height.

2) Try to let all the clubs spin in the normal plane as much as possible. Other spinning planes will cause collisions.

3) Cross the arms very far to make the a-throw. This will enlarge the throwing space, which reduces collisions. It will also facilitate the c-throws.

4) Try, just as with balls, to let the b and c-throw follow the a-throw closely. Otherwise the pattern will go too wide.

5) As you cross the arms very far, it will be hard to make them spin in the shoulder plane. That will make them collide too. The solution to this problem is quite out of the ordinary. When catching the club that will become the a-throw, try to hold it quite loosely, and push the handle more outward than the body, so that when throwing, you hold it as in the illustration.

Correcting the spinning plane of the c-throw is less important and easier.

These guidelines make things a lot easier, but they don't make it easy !!

5 Learning five *O=70 !=∞*

There's not really a method to learn five. Ones you master the four ball MM, you should feel the five ball one too. Starting out of reverse cascade is mostly done by a lot of jugglers. I like cold start too, cause it's easier to understand what happens.

Mark that the wonderful effect created in the three ball MM; that all the balls arc to the other side, is possible with five balls too. The five count mess isn't really harder than the three count one.

Five clubs**, I know, it should be impossible, but some jugglers don't know that word. One of them is Toby Walker, and I can assure you, a fluent five club Mill's Mess isn't impossible.**

More then five, for those who dare, six is possible, for a few people, seven for Ben Beaver.

Specific problems

Collision problems

In the beginning, collisions are a though problem, but ones you get the hang of it, they disappear (balls). The big secret is that you have to cross the first ball wide and follow it closely with the second, so that there's enough place left to throw the third, and then, just keep the pace.

With **clubs**, collisions will stay the major problem. It helps if you cross your arm very far to do the a-throw. And it's very important that the b and c-throw follow the a-throw closely.

Rhythm problems

It's sometimes hard to keep the 1 2 3 rhythm. As there are three different throws with a different feeling, it's hard to throw them to the same height. Try to seek yourself which ones you throw too low or too high. Usually it's the c-throw that is too low.

Style variations: Side and position

These variations are of most importance with three balls, therefore I'll only discus it for three balls.

Most of these variations are a lot harder and uglier than the basic MM, but they can be very beautiful if they are applied on other patterns (as 441 or 423).

However more important is that you twist your brain to untill you master them. This will make crossing and uncrossing your arms on every possible way a natural thing to do. Something you will do while experimenting, while searching new stuff. And that will create an endless number of new possibilities.

Analysis

First, let's get back to the matrix:

	Count:	a	b	c	a	b	c
What:	Side:	L	L	L	R	R	R
	Height:	3	3	3	3	3	3
	Arm:	r	l	r	l	r	l
How:	Position:	Co	N	Cu	Co	N	Cu
	Reverse?:	rev	rev	rev	rev	rev	rev
	Direction:	X	X	X	X	X	X

Searching variations on side and position means searching other sequences of throws. (you could also search new positions as "middle", but that would take us to other stuff, Boston mess and so). What else can we do instead of the Co-N-Cu sequence ? Well, to be honest much, really much, of which I'll discuss a few here:

3 **Windmill** *O=7*

In this variation, all the balls are thrown on one side, towards the other side, caught there but thrown again on the "throwing" side. This gives a nice circular effect, something like a windmill

Sequence (right handed):

Side:	L	L	L	L	...
Position:	N	Cu	N	Cu	...

This means that one arm always throws normal (reverse), and crosses to catch, but then goes back to it's place. That going back to its place, is the only new thing to learn, try it, you'll see that it isn't really awkward.

Improving

Make fluent arm movements. Especially the arm that catches crossed, should catch while going down so that it can make a half circle while getting back to it's place.

Try to let every ball arc on the same line; to let them cross equally far. To do so you'll need to cross the "normal" throws a bit less, and the crossed under throws a lot more (or that's how it will feel).
If a ball doesn't crosses enough, then don't try to correct it the following throw. Don't think in terms of throws, but in terms of arms, try to cross the next throw with the same arm more.
Further, try to get it low. So that it gets fast and more circular.

Variations

3 *Shoulder mill O=65? !=70*

This looks best with clubs. It's very hard.

3 **Fake Mill's Mess** *O=6 !=10*

As in the classic MM, you three times on one side, followed by three times on the other side, however now, you only cross ones instead of twice.

The sequence is (starting with the right hand):

Hand:	r	l	r	l	r	l
Side:	R	R	R	L	L	L
Position:	N	Cu	N	N	Cu	N

As in windmill the sequence contains that crossed under to normal move. Again you need to get your arm back to it's place.

It's ugly unless it's done smoothly. You really have to make it fluent, it's not automatically fluent.

₃ **Five count MM** *O=9 !=20*

If you take the normal sequence you can turn it into a five count trick by staying two count (=one loop) on the same position.

Windmill five count (a combination of windmill and Mill's mess)::

Side:	R	R	R	R	R	L	L	L	L	L
Position:	N	Cu	N	Cu	N	Co	N	Cu	N	Cu

Crossed five count (stay one loop with crossed arms) :

Side:	R	R	R	L	L	L
Position:	Co	N	Cu	Co	N	Cu

Open five count (stay one loop with uncrossed arms):

Side:	R	R	R	L	L	L
Position:	Co	N	Cu	Co	N	Cu

Of course you can stay four counts into the same position, or twice two count. This will make seven count possible.

₃ Four and other even counts *O=9 !=20*

If you want to juggle an even count MM, you'll need to do a fake MM on one side, and a normal on the other. The rest stays the same.

₃ **Reverse Mill's mess** *O=20*
Why make things easy ?

As said before, a reverse variation means that what you see is the same as what you would see if you what a reversed played video. As there is an animation on the right side somewhere, you can easily flip it the other way and look at a perfect reverse Mill's mees.
Although it is that simple, reverse mills mess is (and will always stay) a hot point of discussion. A lot of possibilities seem to give a reverse mill's mess appearance. However the real reverse MM, feels very un natural, and therefore I prefer to juggle the reverse fake MM.
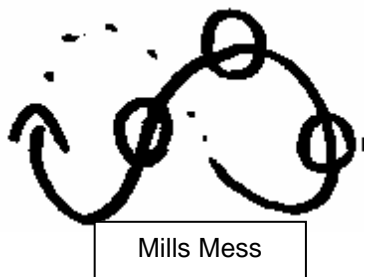
Mills Mess

Reverse Mills Mess

The matrix is::

Side:	R	R	R	L	L	L
Position:	Cu	N	Co	Cu	N	Co

Reverse?:   nr   nr   nr   nr   nr   nr

With nr: not reverse = normal throw

Juggling it

The whole trick comes out of the crossed "not reverse" throws. If you cross an arm, throwing reverse is the natural thing to do. However, it is possible, and not that much harder to make normal throws.

Try to juggle with crossed arms, you'll do reverse throws. Now, throw wide, so that you can throw under the ball (= normal) and keep on throwing under, you'll see that it feels strange, but that it ain't that much harder.

Fig reverse crossed arms

(Mark that as normal Mills mess is juggling with crossed arms, changing the upper and lower arm, you could do the same out of this normal throw crossed arm, and you'll come up with a strange MM)

Cross your arms, start with the crossed arm. Make a "not reversed" throw, really stress it, make a large throwing circle from the outside downwards to inside, and throw.

Fig

Continue the movement so that the arm gets on it's side. The other arm does a normal throw, and moves on, crosses over the other arm, and catches the first thrown ball. (Train this with two balls untill it's fluent then take the third ball.) When the second ball drops, throw a normal throw, catch it, and start doing the same sequence on the other side.

As in the Fake MM, you'll need to make it fluent.

₃ Other reverse variations

Instead of reversing everything you can reverse 1 line of the matrix. For instance not-reversed throws in a normal mill's mess. Or you can reverse some throws of one or more lines.

Height variations: site swap

Site swap mill's mess with balls is really fun to do. For clubs it's usually not worth the effort. There are some things possible with the 423 pattern, and if you really want you can try the others too of course. For rings, I guess the same can be said, Site swap MM is really a ball thing.

Site swap patterns done in Mill's mess look completely different than if they are done normal. Usually they are quite spectacular, the most beautiful ones I will discus here.

However, there's an other side to the medal, it gets a lot more complex. It's no longer true that odd heights cross, and that even heights go straight up. To know whether you have to cross you throws or not, I will explain the catching sequence in MM a bit better. I will speak of seven different catching sites. Extreme left, left, left-centre, centre, right-centre, right, extreme right. Left and right is were you normally catch.

Let's say that we will throw on the right side, then the ball that will become the:

    a-throw needs to drop between LC and ER, best between RC and R
    b-throw needs to drop between C and R, best between RC and R
    c-throw needs to drop between LC and R, best between C and R

So, if all the balls drop between RC and R you can catch them and make three throws. But to avoid collisions, or to rise the beauty of some patterns, you could let the a-catch, or the c-catch drop a lot more to the left. However in what follows I will always speak about the right side (what means between centre and right).

So, to know whether a throw should cross or not, we only need to know when it drops, so that we know on what side we are throwing at that time. I'll give some examples:

L	L	L	R	R	R	L	L	L
3	3	3	3	3	3	3	3	3
a	b	c	a	b	c	a	b	c
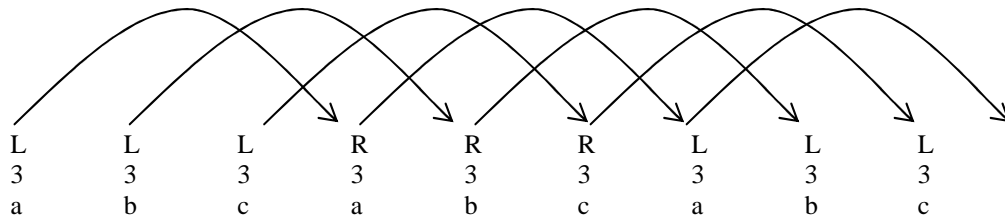
As mills mess is three count, the 3's all fit in perfectly. Every ball has to be thrown in the next three throws. As those throws are made on the other side (RRR becomes LLL), they should all three be crossed.
But what happens if we throw to height 4 ?

L	L	L	R	R	R	L	L	L
4	4	1	4	4	1	4	4	1
a	b	c	a	b	c	a	b	c
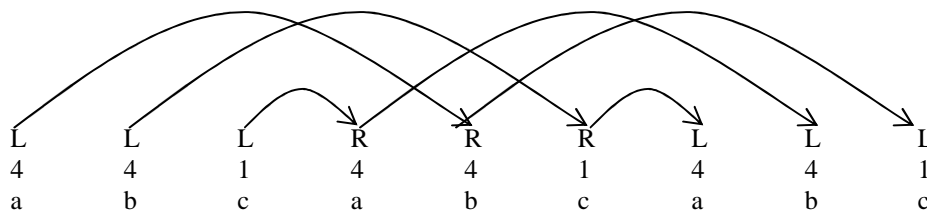
Again every ball has to be thrown in the next series of throws, so that is on the other side, so they should all three cross. This means that heighr 4 needs to cross. However, if we only start throwing 4's on the second count (b) of the mills mess this happens:

L	L	L	R	R	R	L	L	L
3	4	4	1	4	4	1	4	4
a	b	c	a	b	c	a	b	c
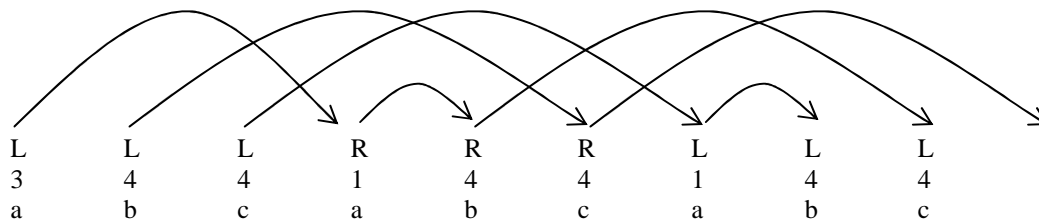
The second thrown 4 has to be thrown two series later so again on the left side. The 1 drops still in the same serial, and is therefore also thrown on the same side. Therefore they are thrown straight up.

This illustrates that there's a big difference between 441 starting on the a-throw, and 441 starting on the b-throw. On the c-throw it will look different again. This means that for every pattern we know we get three new ones by doing them in MM (so there's work to do).
Therefore, I will always ad on what throw the site swap starts. 441a starts on the a for instance.
Snaps are sometimes hard to do. Therefore, in five count patterns, the following thing can be done. Juggle the "open" five count, that is the Co N N N Cu sequence. Start so that the snap is done on the second normal throw. This feels really very natural.
If you wanna juggle 441 f.e., then doing 44133a, will be easier. 55514 is easiest as 55514c : Cu Co N N N.
Enough theory, here are some patterns:

Three props

₃ 423 O=15 !=40

423a looks and feels smooth. To juggle it, throw the a-throw some higher, crossed as normally. Then don't throw with the other hand, just move to the other side

with it. Focus on the fact that the hand that threw the high ball will need to throw twice.
The hand that holds the 2 can go under the 4, or wide over it. This last one gives a certain reverse Burke's Barrage effect, but I like to keep this pattern small and fast. Therefore the 2 under the 4 I like best.
With **clubs**, this is one of the only interesting Site swaps. Throw the 4 in simples.

Guy Waerenburgh, an extremely good juggler (when he's not on stage) juggles this in simples with a loop on the 2, it looks very smooth, the way he does it.

423b

423b is quite stupid, unless you do the following variation of it. Throw the 4 extremely high (with **clubs** high double). Then unlike normally, don't hold the c-2 in your hand but pop it up and over the opposite arm, from the outside to the inside. (See also 423 variations)

423c, not very interesting. If you barrage the 2 above the 4 you'll end up in Burke's Barrage.

3 441 *O=20 !=40*

44133a is easiest to learn (style abbbc) and looks as if you do a shower while messing.
The two 4's are crossed and need to be only a split higher than the 3's. Try to do them on the same height as the 3's, just juggle a bit faster on that moment.

441a is the next one to try. As the arm that gets the one has to cross immediately, it's a lot faster then the 44133. It feels strange to snap such a one in MM, but you'll get used to it.

441b sucks., **441c** is nice.

441a reverse (*O=30 !=45*) is really flashy (the crossed under one). It's easiest to it start like this. Hold your arms normal. Right hand throws a ball over the left arm,. Then the left hand throws a fountain 4. It should peak just after the first four has passed, and thereby don't collide. Right moves towards the opposite side and gives the third ball into the left hand as it crosses under it. Then try to go on feeling. Always throwing two cascade 4's, the second with the crossed arm.

3 522

522 looks always stupid with balls, but 522c looks very flashy with clubs. It's called Mike's mess and it's explained some pages further.

3 531 *O=20*

A 5, followed by a 3 looks very nice if they start on the same side. Then they both arc, peak and come down together. If you're juggling in normal style (=not MM), you need a 4 heights difference. 723 or 72312 for example are such patterns. In MM however, you only need a 2 heights difference, which occurs more often (as here in 531). I'll call this effect the rainbow effect.

531a creates that effect best as the props then arc wide. To learn it train on **53133a** (abbbc) first.

531b doesn't looks that nice, but it feels good to throw that 3 around the other arm.

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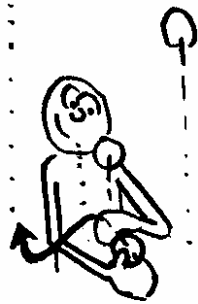
531a

</div>

531c doesn't creates that rainbow effect as the 5 and 3 are thrown on the other side. However it looks very good if you do it as this. Cross your arm very far under and throw the c-5 straight up. Throw the a-3 straight up in the middle of the pattern.

If you juggle it like this, you create a Boston Mess effect, with two high columns on the outside.

Other patterns with 3 balls

Search them yourself, but I guess the best ones are explained above. **612, 64113c, 61314c, 45123a** and **51414c** are doable. *Joris …* does 801 with clubs (821 LT), and it looks nice.

Four props

4 534 *O=40*

Without any question, **534c** is the easiest. To do it, throw the 5 straight up. *Manu Laude*, juggles a fluent triple single double as this.

534b and 534a look completely different. They are a lot harder cause the needed height difference between the 5 and the 3 is a lot more. I like 534a most. In both tricks there is rainbow effect (a low ball is thrown after a high one on the same side. They peak together, and the low one is caught first). In the 534a, both balls are thrown crossed. The 534b, looks best if they are thrown a little to the centre.

It's possible to combine them with 723. It looks best and it's easiest to go from 723 into 534a. The needed sequence is ...723 723 3 534 534... Throw the last two 7's almost straight up, so that they don't go over the middle. Then after that last 723, throw a linking 3 to get into low state. Throw it to the centre. Move the opposite arm to the other side and start to Mess (with a 5).

In this sequence the first 5 starts on the opposite side of the last 7, thereby the image of the 723 stays alive. This, although they are thrown with the same hand.

4 552 *O=45*

552b is the most common one. He looks flashy when the a-2 is barraged around the other balls. It's not hard at all to do it just ones, in a normal 4 ball MM. Therefore, throw the b-5 crossed as you would do if it was a 4, only a bit higher. After the second 5, try to use the pause to make an orbit. It feels very natural to do. Just try and you'll come out into it.

To do the 552b continuous, it's an other story. Then, to keep it fluent, you'll need to throw the b-5 outwards, and the c-5 needs to cross it on the inside. It's really unnatural to do.

552c can be nice, but I don't like it although I like 642c a lot.

552a sucks, just as much as every other MM with an c-2 (if you don't throw the 2).

4 633 O=50

633c is the easiest. Try to pull inward as hard as you can while throwing the 6 so that he flies towards the centre and not outwards. One outward 6 can already cause an overdose.

I like to juggle the **633a**. To get your arm to the other side, to throw the next 6, you really need to cross it very far. It gives some kind of mechanical or scissors feeling, really nice if you can keep it going.
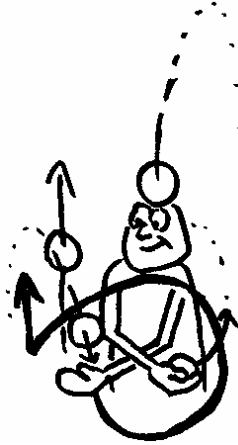
4 642

I like **642c** a lot. As the 2 is an b-throw, your arm can swing in a large circle, from the opposite to it's own site to throw. And as you don't throw the 2, you can swing on again to the opposite side to throw a 4-a. It really can't get much better than that.

However, the 642a is looks really nice too. It creates a double headed box (page Y, 82x 42x) effect. You can double the effect by making an up and downward move under the arm on the 2-c. It all looks nice, but it's a very fragile effect, if don't master it perfectly, the effect fades away completely.

4 55514c O=43

Throw the c-5 throw a bit higher then the 4's, then throw the a and b-5 throws, a bit higher. Throw a normal snap, continue with a reverse 4 (last b-throw), and go on doing the normal MM. This variation looks as if you juggle a shower in the MM.

It's possible to stay showering. (explanation for this can be found in chapter 14, but you can do it without understanding it too, so just try it).

4 56414c O=45

Do the same, but now throw a very high a-throw (a 6), then do 4 1 4, and continue MM. It looks as if you do a double headed shower in the MM. Again it's possible to continue a real double headed shower.

In both patterns you can do the 5c as low as the 4's, then the speed goes up just when you throw that fake shower. Like that, it looks even better.

There's a lot more possible, but it gets really hard fast. If you go further on this try to search for 723 effects or 2-c throws.

Multiplexes and Mill's Mess

Multiplexes and Mills Mess haven't got a lot in common, however they have a very good relation. You can go extremely complex in it, or stay quite basic. The possibilities are endless, and the needed level is quite low for a lot of them. Just because there is so much to do with it, I won't give you very much examples. Experiment yourself and you'll find more than enough.

To get used to crossing arms, juggle try the style-variations and reverse MM first.

Three props

3 Triplex start *o=36*

Triplex start (balls on a line) looks excellent. Try to let the props drop in the centre.

3 (4,3)1421c Crossed or Open five count   *o=15*

Just try it.

Another similar nice ones are that feels nice is 43 1 3 3 4 2 1 (NNNCuCoNN). The last one can switch smoothly into 53133a MM with the linking throws 43 1 3 3.

For other patterns, try the multiplex patterns I've given you in the previous chapter. You'll see if you like some.

Four or more

4 (3,3)33 to 4 *o=36*

If you juggle (3,3)33 Mill's mess it's fairly easy to switch into four prop Mill's mess. It's easiest if you juggle (3,3)33a. But you can do it with the (3,3)33c to, as illustrated.

4 (4,3)23 *o=25*

I like the a-form most as you can catch the multiplex 3 while crossing the arm really fast. The b- and c-form are very similar, and also quite enjoyable .

4 (4,3)4423a *o=35*

On the pause you can hold your hand in the middle, and wait for the right ball to drop into your hand, but it's a lot better if you move your arm up while catching the ball that will be paused, to move further up and to orbit around the first single 4 before catching it.

4 (4,3)23(2,2)3 or (4,3)24(2,2)3(2,2)3

These are explained in barrages. Mill's mess and barrage are sometimes very similar.

4 (43) 4 5 2 2 *o=22 !=38*
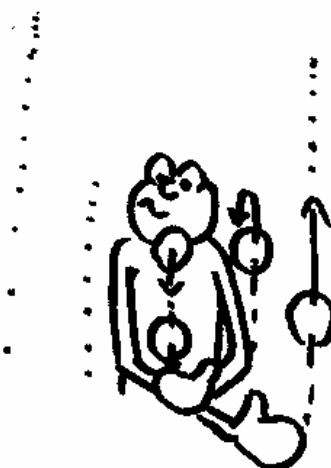
You could juggle this one as explained for the (4,3)4423a, but a lot simpler is this: Throw the 43 straight up, then the 4 straight up, cross your other arm under and throw the 5 straight up on the outside of the pattern. So if you have started right, you get right side, left side, extreme left. Then stop throwing and catch everything up. To catch the 3 cross your arm a bit. Just before the 5 drops, throw the next multiplex to catch it.
You could move up to catch the 3 and orbit around the 4, but I like the naked pattern too.
This is the matrix:

Hand	r	l	r	l	r	
Place:	**Centre**	**Left**	**Extreme Left**	**-**	**-**	
Height:	**43**	**4**	**5**	**2**	**2**	
Throw:	*Normal*	*Normal*	*Cu*	*-*	*-*	-

If you improvise while juggling, you sometimes come up with really complex stuff. As you have found them by following your feeling, such complex patterns will always stay feeling nice.
This is such a pattern. You can try to juggle it, but I guess it's funnier to search others yourself. Don't be afraid , there are enough patterns for everyone !

5 54 5 5 2 4 a

For those who like five balls, this looks better than 54 2 4.

Friends of Mills Mess

3 Mike's Mess !=45

As mentioned higher, Mike's Mess is actually the pure 522c MM. I hate it with balls, but with clubs I love it. The 5 is thrown under the arm, and on the double pause you need to do the basic swinging pattern, which is explained in chapter 1..
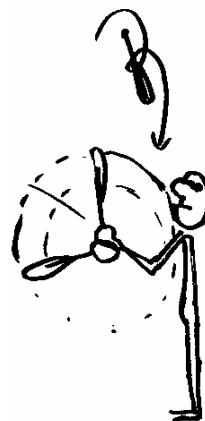
Learning Mike's Mess

You need a fluent Mill's mess, MM-swing and nice high doubles as c-throws (under the opposite arm. If all that works, go for it:
Start by throwing a high double under the opposite arm towards the centre. Then start the Mills Mess swing on the other side. Instead of doing the third swing, throw a high double again and catch the incoming one. Continue this.

Improving and variations

Try to swing as much as possible in the nose-plane To make it better, don't try to swing faster. Instead, swing slowly and regular.

3 Half pirouette !=60

It's possible to do a half pirouette in Mike's mess, but to continue swinging you will need to learn the reverse swinging pattern (chapter 1).

3 72222 !=50

If you throw a high triple, you can do a 6 count swing.

4 822 !=80

If you master the 72222 continuously, you can try the Four clubs Mike's Mess. The 8's can be thrown in triples because the pauses may be short ones. The 8's have to cross (to the centre). It's actually not so beautiful anymore because the 8's fly too high, so that the pattern isn't coherent anymore. Only if you see it from very far it nice.

3 Two high, quarter pirouette stop

Before throwing the c-5, you can swing a bit faster so that the opposite hand can do the a-swing on the same moment. On the moment instead of doing the swing, throw the club as high as the other. They go up together and spin in an other direction. If you make a quarter pirouette you can easily catch them up.
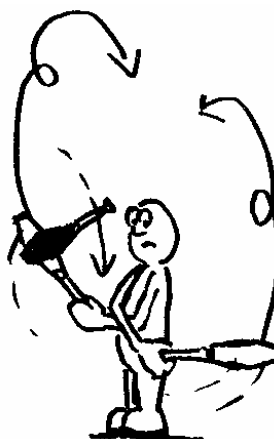
3 Synchronous Mikes mess !=50

See more synchronous Mills mess.

Boston Mess (also called Boston Barage)

In Boston mess all the props are thrown in vertical lines next to each other, and the arms cross and uncross to manage it. There's an animation on the right side.

3 Three props *O*=12 !=20

There are three vertical lines on which the balls are thrown, one right, one left, and one in the centre. Although, the principle is really simple, the throwing sequence is complex (right handed):

Count:	1	2	3	4	5	6
Place:	R	C	L	R	C	L
Hand:	r	l	r	l	r	l

Mind that there re two directions possible. The right hand can move R-C-L or L-C-R (as in the matrix above)

Learning

It works best if you throw it on feeling. Just catch where a ball comes down, and throw it straight up again. Always try to throw where you caught. If you want you can follow the throwing sequence. Mind the following things:

Never move with a ball in the hand. If you have to catch on the other side, then throw straight up, move and catch.

Make sure that you always catch the balls in the hand that didn't threw them. (The higher you throw, the more time there is to do two in one hand, so keep it low)

When trying to repeat the sequence, problems mostly occur on catch 3. Be aware of that. Your starting hand will need to throw on it's side (throw 1), and move all the way to the other side to catch that ball.

Improving

1) Learn the other direction.
2) You should make it look even more complex by crossing the right arm (movement between throw 1 and 3) ones over the left arm ones under it. Then the same sequence only repeats every twelve throws, and everything looks more symmetric.
3) Then get it low and wide, perfectly straight up.

3 *Play with Boston*

First try to combine Boston Mess with two-in-one-hand in columns. Then the other hand can make some moves with a ball in the hand (getting fast to it's place, barraging, orbitting, up-downs, machines ...). Play with it, improvise while juggling.

3 *Boston-machine* *O*=30

It's possible to keep one arm high, catching all the props when they peak, and letting them drop in to the other hand. As it is a 3-drop, you need to throw the balls a little upwards.

Mind that one direction is a lot easier than the other. With the right hand up that is: L-C-R. However if you want to switch upper hands (which looks nice), you'll need to earn both directions.

Illustration

210

4 Four props *o=30*

There are several possibilities of throwing sequences that involve arm crossings. The best looking one is:

```
Count:    1    2    3    4
Place:    R    RC   LC   L
Hand:     r    l    r    l
```
(RC = rightcenter, LC= left center)

Mark that it's also possible to throw all the balls on four vertical lines without arm crossings. As the arms don't cross, it's called a wall (see more chapter five; walls).

5 Five props

It's possible, and it looks very nice on computer, but I've never seen it in reality (although people tell me that Ben beaver does it with ease, but I prefer not to believe that).

Synchronous Mill's and Mike's Mess

Synchronous Mill's mess

The basic pattern of the SMM is the S four ball pattern: [4 4] [4x4x]. Three ball patterns are derived out of it by throwing [4 4] [4x0] or [4x 0][4x4x].

3 [4 4] [4x0] o=15 !=40

Throw the 4 4 reverse. Then cross the hand that holds the third ball under the other arm and throw it up there. Repeat the same, but now the single ball will drop into the other hand. To create the time to reach under the other arm you need to catch that single 4x very high and take it down to the other side in one move.

illustration

3 [4x 0][4x4x] o=20 !=45

This gets harder, but also a lot better. Start with a reverse 4x. Then cross the arms and throw the two 4x's up. Make sure that they stay close to each other, but that they don't cross in the middle too. Uncross and catch the single 4x in the other hand, continue the uncrossing movement and throw it reverse up again. Catch the two 4x's high, cross your arms and throw them up again.

4 [4 4][4x4x], the 4 synchro mill's mess o=45 !=80

If both patterns described above work properly you can try this one. Start with two reverse 4's. Then cross the arms

and throw the 4x's straight up. Continue the same sequence. Always catch the 4x's very high.

It's a nasty pattern to master. First you'll have to avoid the collisions. The balls all need to drop in the centre, but make sure that they never cross. Theoretically spoken, [4 4][4 4] and [4x4x][4x4x] are possible patterns too, but they would involve crossing balls in the centre what would make avoiding collisions almost impossible.

To make the balls always drop near the centre, but never over it, you have to aim the crossed arm throws much more to the middle than the other ones.

Second to get it fluent you need to throw to the same height with both hands. I always have to aim higher with the arm that crosses under the other, to get the balls to the same height.

To keep everything were it should be, it's more then a struggle, it's a real war. Luckily I like to fight gravity.

Other patterns:

3 [6x4][20]* o=30

This is a really flashy trick (almost as flashy as Lolo, the juggler I first saw doing it).

Start arms crossed, throw the 6x straight up with the arm crossed under, and the four, very low, straight up with the upper arm. Then on the pause, swing your under arm al the way around the other arm and the 4, so that now that arm is on top, then the mirror image repeats.

Train on the 64 first, throw the 4 extremely low.

illustration

4 [6x4][24x]* o=50

This is about the same, but with 4 balls.

4 [66][22][44] o=50

Throw the balls (I guess if the four ball SMM still ain't hard enough that you will be juggling balls) that you throw with crossed arms up to height 6. Uncross the arms to catch as usual, but then, continue the uncrossing movement, go up with the arms, and cross them again while going back down (so you do two orbits around nothing). Then continue as you want.

3 Synchronous Mike's Mess I=50

Instead of throwing 522 to do Mike's Mess, it's also possible to throw [6x2][2 2]*. Throw a 6-c while doing an a-swinging with the opposite arm. Then uncross the arms and make two b-swings (swings next to you). Cross again, and repeat the mirror image.

Burke's and other barrages

Barrages are patterns in which an arm has to cross over the opposite arm to catch a prop over there, and in which that arm has pause after catching so that it can come back making a large move (= a barrage). It are usually synchronous patterns.

If you to make barrage out of a normal pattern, the method is always the same:
1) The pattern needs at least one pause.
2) Find out which throw becomes a 2 when caught.
3) Change the direction of that throw. (3, 4x, 5, 6x straight up, 4 or 6 crossed)
3) Juggle it
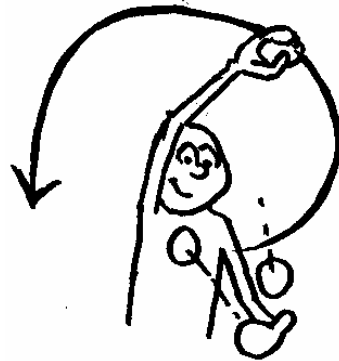
Burke's Barrage

Burke's Barrage is a barrage in which one hand throws all the props towards the other hand (that is holding one ball). Just after throwing those props, that hand reaches over to catch the first prop that was thrown, moves further to the outside and comes back to it's place by making a large circle around the descending balls. The other hand catches the other balls and throws them back to do the same.

3 Three props: [4 2][4x2]*a *O*=6 !=25

Understanding it

There is a cartoon of it at the right side of the pages. The pattern that is used is [42][4x2]* (the synchronous 423). However, the 4 is thrown crossed, as the 4x. Therefore you need to cross your arm, to catch that ball on the other side. To get the hand back to its side you can use the pause(s) to make a large arm-movement.

Learning it

First learn [42][4x2]* (with clubs, do it in simples).

Then learn to do the barrage just ones. Hold two balls in one hand. Throw two 4x's (cascade 4's), fast after each other. Then cross your arm to the other side and catch the first of those balls above the other hand, move on a bit, let the other ball drop in the empty hand. Swing the arm to its place (above the descending ball). Try to cross, catch and move back in one move. Do it so fast that you get the hand back on its side, when the second ball is caught. Then train the other hand.

Then learn to do the barrage just ones while juggling three balls. Juggle a slow 3 ball cascade [4x2]*, throw twice with the same hand, cross your arm to the other side, catch the first ball, barrage back, and continue juggling. You can now do the same with the other hand.

If the first ball you throw after the barrage is already again the first of the next barrage, you are juggling Burke's Barrage. The hands always throw twice and then barrage.

Improving it

To improve it, make larger circles, and do them as slow as possible.

With **clubs** throw slow simples. The only secret to it is not to panic, just keep throwing slow, high simples. Try to catch them on the very end and stretch your arms fully, so that the circles you make are as large as possible.

Variations

3 Inside barrage *O=7*

Instead of making a large barrage around the other balls, you can do a small barrage under the next thrown 4.

Illustration

3 Contact-ball variation *O=45*

The to-be-barraged ball can be caught on the back of the hand, and the ball can be flipped to the palm of the hand while barraging.

3 Extra swing *!=35*

It's possible to do an extra swing on the barrage. Try it first with one club. Make the barrage, but when your hand is again on it's side, stop the arm movement and let the club swing on one spin. It's natural to let it spin behind your shoulder. Only then come completely down to it's place with your hand.

3 Reverse knitting *!=36*

In this variation, you swing twice, in the nose plane. First a belly cross swing, then uncrossing and a drop swing.

Similar to this thrick are Knitting, Two Swings and Backstroke explained in chapter 5.

4 Four prop Burke's barrage: [6 2][6x2][6x2]*a *O=40 !=65*

It's quite the same. Only now you need to throw 6's. Throw three times to the other side and then move towards that side to catch the first ball. To get the arm back to it's place you now have three pauses, which is really much. Therefore, as a variation you could go back some faster and do an extra weave.

To improve it, concentrate on the 6's. Try to throw them on one line, that's by far the most important.

Variations:

It's nice to switch in or out of a shower.

Very nice is to switch into statue of liberty. Just stop the barrage when your arm is all the way up.

5 Five prop Burke's Barrage

I hope explaining isn't necessary anymore.

Other Synchronous barrages

*3 Three prop two count barrage: [4x2]*a O=15*

Throw the 4x straight up. Then do the same on the other side
and cross your arm over the other one to catch the prop.
The secret to it is that you have to throw straight up while
your already moving to the other side with your arm. Train on
that with one ball first. And when you try three balls,
concentrated only on throwing straight up. Ones you can do
that, it's really easy.
If you train it, train it for it's awkward appearance, and not for
it's beauty.

4 Four prop multiplex barrage: [4x4 2][4x2] O=20

There are many multiplex barrages possible, but this is a nice and easy one. Throw
the 4x4 as a 4x4x couple, barrage the lowest or highest one as you which. Mark that
the same is possible with 5 balls: [4x42][4x4x2].

4 Four ball barrage between a couple: [(4x,4x) 2x][2 4x]

See chapter 6

*4 Four prop four count barrage: [6x2][6x2]*c O=43*

It's easiest to start with two balls in each hand, throwing a 6x straight up out of one hand,
and then with the other hand throw crossed, straight up, and barrage the first thrown ball.
If you try the 552 barrage it's natural to fall into this barrage as [6x2][6x2]* is the
stabilisation pattern of 552.
It's possible to do the crossed throws straight up in the middle of the pattern, then there's a
wall effect created. Try then to move in straight lines with the barraging hand.

*4 Four prop two count barrage: [6 2]*a O=50*

The 6 is thrown crossed. It's easiest if you do it quite
high, and if you don't throw too wide.
I like to go into this pattern out of the [6x2x]*. On
a certain moment, stop snapping, cross your arm to
catch the ball that was meant to drop in the other
hand. Go on barraging.

Other possible four prop patterns of little interest
are:
[6x4][24x]*a
[6x4][24x]*d
[4 6][6x2][24x]*c
[4x6][62][4x2]*a, barrage always on the first
pause.

Asynchronous Barrages

Theoretically spoken it's perfectly possible to do ASS barrages, but it's always a lot harder, and it doesn't looks any better. It's always hard to keep them fluent.
Every pattern containing a pause can be used.

Obvious examples are 423, 552, 642. Less obvious are multiplex patterns as (4,3)23, although very easy.

4 (4,3)23 a O=30

Learn the normal (4,3)23. Then throw the 43 as a 33 couple. Throw the 3 and move to the other side to catch the 4 and barrage back. The barrage needs to be done really fast, what makes it hard.

4 (3,4)24(2,2)3a (and (3,4)24(2,2)4(2,2)3a O=15

This is a very peaceful barrage. I like it.
LP: (4,3) 2 4 (2,2) 3, juggled normal.
Throw the 34 straight up as it was a 44 couple. Cross your arm (still holding a ball) to catch the 3 and move on to barrage around the 4.

Revenges

A revenge is a style in which an orbit is followed by a barrage with the same arm. Therefore, a revenge needs at least two pauses. Further an orbit needs to go around a prop, and therefore the prop may not fly too high. All together this makes that there aren't much revenges possible.

3 Rubenstein's Revenge: [4x2][24x][4x2]* O=15 !=30

Learning it

There's an animation of it on the right side of the book. I hope it will help you understanding this complex style. Try to see what happens, every throw is a cascade throw, there are only 3 throws before the mirror image is repeated. On two of those three throws, the other hand is orbiting or barraging.

First learn the barrage and orbit with one hand. (See chapter 1). No matter what, learn Burke's barrage before you learn RR.

The orbit

Then learn the orbit-barrage combination with **one ball**. The hand that will orbit is empty (in contrary with the illustration) and orbits as illustrated around a thrown ball. Mark that the ball is only thrown when the orbitting arm is already coming down again, so that the orbit can be done quite slow.

The barrage

The orbit-hand continues it's movement and orbit's around it, when it is on the outside of the first thrown ball it catches it and barrages back to it's place. Do this move until you don't need to think anymore.

You can now do the same with **two balls**. Hold one in each hand, and orbit as you did before, but now while holding a ball. When the orbit hand is on the outside, throw the second ball before catching the first one (as illustrated). So throw it over the first one, from the outside to the inside ! Now barrage around the second ball.

After barraging, before catching the second ball, throw a normal cascade throw and start orbitting with the other hand… Do this move until you don't need to think anymore

Finally take **three balls**, hold one in the orbit hand and two in the other. Do just as you have learned with two balls, but now, when the second ball drops, make a normal cascade throw with the not-orbitting hand towards the orbitting hand that comes back to it's place to catch that third ball.

Then you need to start the mirror image. So, go up and towards the middle with the other hand, so that it's ready to orbit as soon as the hand that has done the orbit-barrage is ready to throw again.

With **clubs**, throw slow simples.

Improving it

Do everything as fluent as possible, make large barrages, and throw as late as possible so that you get more time to orbit-barrage. Try to keep the whole pattern low. Don't juggle in front of your head, but in front of your body. Therefore you will need to throw very late.

For **clubs**, the same can be said. Further, hold the clubs on there very end and let them swing instead of your arms. Try then to swing the clubs perfectly in the shoulder plane. Finally do the throws also in the shoulder plane (as in the soleil Mill's mess).

Variations

3 Asynchronous Rubenstein's revenge O=13 !=30

If you throw the prop under the arm high as a 5, you get into a 52233 asynchronous Rubenstein's revenge. I don't like it.

3 Small barrage O=15

Some people only barrage around the second ball. The third ball is thrown some more to the outside, and the barraging arm doesn't goes around it. It makes both the barrage as small and fast as the orbit. It looks peculiar. I don't like it.

3 Expanded Rubenstein's   *Revenge*
O=20 !=35

As written higher, you actually use only two pauses out of three. With **balls** do a weave, with **clubs** a club-weave (chapter 1). Ones you get the hang of this, you'll never do the Rubensteins revenge without these swings anymore. It feels that much better.
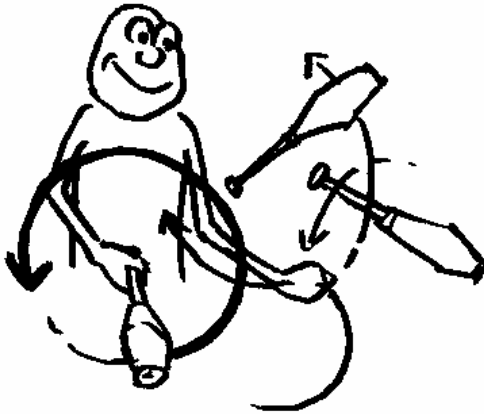
3 Rubensteins revenge soleil

It's very similar to the Mill's mess soleil, so first learn that one. Then if you try soleil in Rubenstein, try to switch sides extreme. It looks better, and the catches are easier.

3 Rubenstein's revenge behind the back !=80

This is a very impressive but extremely hard exercise. First you should learn, and master fully both MM behind the back, as ultimate simple backcrosses with ultimate club-swing (4x2).
Ones you can do those, do the same throwing sequence as in MM behind the back, only now, create pauses by throwing as late as possible and let the club's swing. It should sort out itself. You can chose to do the weaves in front of you or behind the back. I prefer them behind the back.

Jochen Pfeifer juggles this pattern (with the weave in front of him), as if it was the first trick he ever learned.

Four and five ball revenge

It's possible to do four ball revenges without multiplexes, but it normally doesn't looks really well because the required pauses must be created by throwing high (6's), which breaks the image of the orbit-barrage. I you really insist, I guess the patterns for the "four ball without multiplex machines" will be the best.
Multiplexes however leave a lot of possibilities. Especially if you encounter that you can make an orbit or barrage holding two balls.

4 *Two holding barrage [(4x,4)2][4(2,2)][4x(2,2)]* *O=38*

This is a really slow and easy pattern.
The (4x,4) is thrown as a couple, straight above each other, the other hand orbits around it and takes out the highest as it starts the barrage. The barrage can be done really big and slow as you have two consecutive pauses.

Variations

As the basic pattern is very slow you can make it faster by leaving out the [4(2,2)], and throwing immediately the 4x. The barrage however gets too fast as this.
Better is it, to take out the lower ball instead of the higher one. That makes the barrage a bit faster but not too fast, it stays cool and controlled. (Mark that you now actually juggle an asynchronous pattern, but who cares ?).
If you do so, you can slow the pace down again by throwing another [4(2,2)] before the [(4x2,2)]. Then you can barrage real slow.

4 *One holding barrage (4,3) 4 5 2 2* *O=42*

This in contrary is fast and furious revenge, it's quite a bit harder, but it's worth the effort.
Do the same as in the previous one, but now between orbit and barrage throw a 4 (as in the 3 ball RR, so on the outside), move on, catch the 3 out of the multiplex and start barraging. While doing so, throw a 5 under the barraging arm with the other hand.
The barraging hand catches the incoming 4, the right hand starts orbitting again. The barraging hand throws a multiplex to catch the 5.

Variations

It's nice if both revenges are combined. First do the one in which you take the highest ball, then the lowest, and then before taking, throw the low 4 and go on with the last pattern.
The last pattern looks nice if all the balls stay low. To be able to throw a low 5, you'll need to do a very low 4.
A nice and easy transition is also possible out of the 2 (4,3) 4 5 2 columns variation explained in chapter 10.

5 *El sol de Cordoba (4,3)(4,3)52(2,2)* *O=50*

It may not really be a Revenge, but it feels like one, it's a very nice trick, and I'm proud on it, so it's here anyway. There's an animation on the right side. In this pattern two balls drop (theretically seen) on the same moment. However it's possible to juggle if you do it like this:

Start with a reverse 3, then throw both 43's straight up, the second in the centre. Catch the 3, and throw a reverse 5, keep going up with that hand, catch the 4 high (the 3 is caught low in the other hand), move on downwards to the centre of the pattern and grab the 3 while continuing to move that arm all the way round. The other arm just collects the dropping 3 and 4, and throws a 4,3 again when the reverse 5 drops.
Once you get the hang of the two-catch arm movement, it gets really smooth and feels nice.

Illustration again !!!!!!!!!

Machines (balls)

The machine is a style in which an arm takes a ball up and to the opposite side. There it let's the ball drop into the other hand and claw catches a ball while going down to it's own side.

The name is derived from the classic machine that looks very mechanical. This don't goes up for every machine. Some even look very organic.

Machines are mainly a three ball style as they need at least one pause (2), and preferably a 2x drop, and as it doesn't looks good anymore if the balls fly too high.
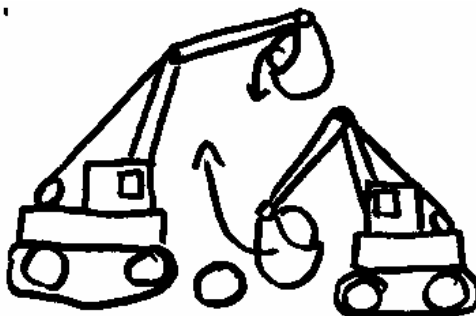
3 The classic machine: [4 2][4x2][4 2x] O=7

Learning it

There(s an animation of the symmetric machine on the right side of the book.

LP: Two in one hand in columns (42) and it's variations explained in chapter 5 as magnet, string, orbit... If you can do them fluently, the machine should work. Take three balls. Juggle two in one hand in columns, so that one ball flies in the centre of the juggling space and the other on the outside. With the other hand go up in down next the to balls, on the pace of the ball that flies on the outside.

Then try this. When the outside ball and your hand peak, don't go down, but move horizontally towards and over the two balls. Ones your hand is completely on the other side, the centre ball should peak.

On that moment, let the carried ball drop and claw catch the other ball while moving the hand back to it's place. The hand that juggles columns catches the drop ball instead of the one thrown up. It shouldn't be hard to catch as it drops on the same moment then the column ball would have done.

If your hand moves up again as soon as it's on its place, then it will again be synchronous with the now outside ball. This makes the style a six count pattern, but the upward and then sideways move only needs to pauses.

Improving it

Try to move up with your hand to the outside first and then go sideways from the one extreme side to the other. The sharper angle makes it look even more mechanic.

Try to hold the ball between your fingertips, and hold it so that the audience can see the ball, and not only your hand that holds the ball.

Learn the symmetric machine.

Variations

Ones you master the machine (and variations as orbit machine), you'll notice that it is a very interesting move when you're searching for 42 varitions f.e.

Try also to train on other, harder drops (slf drops for instance). If you catch it under the opposite armpit f.e., you get into very flashy stuff. You could also let the ball drop behind the back,…

3 *Symmetric machine* O=9

After doing the machine ones, when your hand comes down again, don't go up with it, but throw the ball straight up. On the same moment don't throw with the other hand, but go up with that hand and do the machine on the other side.

3 *Contact-ball variation* O=45

While moving to the other side, to drop, you can do a palm to back of the hand flip.

3 Four count machine O=10

If you move up directly to the other side of the pattern, you only need one pause to get there. However if you go up in one pause you can't juggle the pattern in four count because then you can't go up synchronously with the outside ball anymore. There are two solutions to it. Or you let the ball drop between the two column balls, so that the drop ball becomes the centre column. Second you can juggle a normal fountain instead of columns. This second solution brakes the mechanical image of the pattern, but makes a lot of other variations possible.

If you do the second solution symmetrically, it can look really nice.

3 *Orbit machine* O=15

Juggle two in one hand (fountain). Orbit around one of the balls and follow it to the place where it peaks. There hold still, let the ball drop and claw-catch the next peaking ball.

Take it downwards and start juggling two in one hand in that hand. Start to orbit with the other hand...

Try to search other variations on this theme yourself. Orbit around your head instead, or make other moves then the orbit.
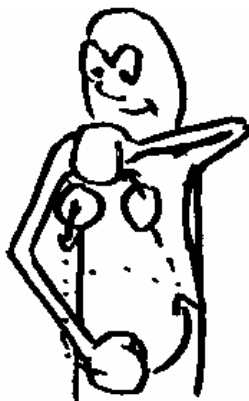
3 Ultimate machine [4x2x]

O=35

Hold one hand where you let the balls drop. The other hand juggles two in one hand. Every time a ball peaks, let one drop and catch the ball that peaks. It's a hard but impressive trick.

Improving

You can try to keep your upper arm completely still. Avoid collisions by making very big throwing circles. If it works it's stoning, but it's fragile, one bad throw makes it drop.

On the other hand you can stress the fast, little sideways movement.

Variation

If you want to stress the sideways movement, it's a lot easier to keep the palm of your hand up instead of down. Like that when you let a ball drop, it will pop up a tiny little bit, but that slows the speed a lot down. As the speed slows, you can make a much larger movement so that the balls fly in a perfect triangle.

3 Self drop machine O=30

Train first on dropping a ball as before, but moving the drop-arm very fast after dropping to it's normal spot, and move on, cross under the opposite arm and catch the dropping ball. (it helps if you pop the ball a tiny little bit up when you drop it)
If you do the same while juggling to in one hand in the other hand, you end up in the self drop machine.
To continue the self drop machine on the other side, try to continue juggling two-in-one-hand in the hand crossed under. It's natural to catch and keep juggling in the upper arm, but don't do so. If you juggle with the lower hand, you now just need to higher the other hand, and the same can repeat on that side

3 Double drop machine [2x2 4][2 2]* O=25

In this machine you let two balls drop. Learn the self drop first. Then take to balls, put them next to each other in one hand (as for throwing a 4x4). Move up and let them drop as normal. Catch the centre one in the other arm, and the outward one in the other hand, crossed under as in the self drop machine described above. To avoid collisions, the normal catch may not catch more than half of it's ball, other wise it will hit the other ball.
If you do the same while holding a ball in the "normal" hand, and you throw a 4 with it just when you drop the other balls, you can do it with three balls. To start it while juggling it's most fluent if you go up with one ball in the arm and catch a peaking ball where you will drop both. But other entries are possible too.

4 (4,3)23 double drop machine O=35

This machine is based on the machine described above, so first learn that move..
Then learn this move: Do the same as above, but throw the 4x earlier, and let the other balls drop when the 4x peaks. Let the drop-balls pop up a bit when dropping them. While moving very fast with the drop hand to catch the self drop, clawcatch the peaking 4x. I know it ain't easy, but ones it works, it ain't that hard too.
Ones this works you're almost ready. Start the pattern by throwing a 4x4 multiplex instead of the 4x if you do the double drop with three balls. Move up with the other hand, catch the 4x when it peaks (so that means it isn't a 4x but a 2x as it is only halfway). When the next 4x peaks, do the move explained above. However now, throw the clawcached ball before catching the self drop, so that you don't end up with two balls in that hand too.
To learn the pattern it's easier to stay juggling two in one hand for a while. On stage, to keep the pattern flashy, you must throw the 4x immediately.

4 Couple machines O=35

Other multiplex four ball machines can be found by throwing a couple (4,4) or (4x,4x) on one of the throws of the symmetric machine. The couple will stay the same throw.
I like the couple most on the throw that you have to claw-catch. Then, claw catch the upper one, and catch the other one normal. It gives a really freaky image.
If you throw the couple on the normal throw (the 4x that you throw just before catching the drop), it's easier but less spectacular.

Four ball machine without multiplex

As mentioned higher, it's hard to find beautiful machines with four balls and without multiplexes. Two heights two require two heights six, and clawcatching a six is hard. Further if all the balls fly high, the mechanical image disappears. However there's one really impressive pattern, with some variations.

4 [8 4x][4x 2][4x2x]*, the two headed machine O=50

The 4's keep the mechanical image, and the straight 8's create an extra mechanical rhythm.
As always in patterns with high and low throws, the secret is to keep the low ones very low. Especially the 4 thrown synchronously with the 8.
In the pattern written above, the machine is done with the arm that hasn't thrown the 8. That's easiest if you want to switch side. If however, you want to throw the 8 always out of the same hand, this pattern is a bit easier: [8 4][2 4x][2 4]
In four count [2 8][4 2] is possible with as linking throws [8 4]. But I like the six count ones better.

4 633 Asynchronous machine O=45

LP: 630
It may look strange, but it's possible to do a machine in the pattern 633. After throwing the 6, go up with that hand to catch the incoming 3 high, and move on to the other side. While doing that, throw the 3 with the other hand, under the high crossing arm. Then drop the ball, and clawcatch that 3.

4 Throw machines

It's possible to throw, instead of letting the ball drop as you normally do. The lower the needed throw, the easier. But even then it's hard, and normally it's ugly.
642 and 55253 are the best ones I know. In 642, the machine is done without crossing the hand.
Just go up with your hand on the pause, and throw two counts later (respectively a 6 or 3).

George mess ???

Balltricks

Difficulty	name	hfst
1	3 balls	2
1	42, Two in one hand	4
1	42 columns	4
1	42, two in one hand	5
1	Rebound 3	7
2	Three prop half shower	3
2	3 prop half shower	3
2	42 cascade	4
2	423	4
2	522	4
2	4x2*, Cascade with pauses	5
2	42 4x2	5
2	42 4x2 Columns	5
3	42 reverse fountain	4
3	52233, 52242	4
3	[44] [40] and [44][4x0]*, Columns	5
3	Rebound 3 cross catch Double bounce columns	7
4	42 Magnet	5
4	42 String	5
4	42 4x2 Fake 44 4x0 columns	5
4	Crossing columns	5
4	Rainbow columns	5
4	Symmetric columns	5
4	Ccascade columns	5
4	43 0 3 2 3	6
4	Rebound 3 cross throw Double bounce columns	7
5	51 The three ball shower	3
5	42 False box	5
5	42 The orbit	5
5	42 Fake machine	5
5	Shower columns	5
5	Rebound 531	7
6	3 Backcross quarter pirouette	2
6	423 Weave	4
6	Box columns	5
6	43 1 4 2 1	6
6	54 1 5 0 2 2 2, a three ball pattern	6
6	Fake Mill's Mess	8
6	Three prop Burke's Barrage: [4 2][4x2]*a	8
7	4x2 The weave	2
7	3 Crossed arms	2
7	51 spinning shower	3
7	(3,3) 3 3 One extra ball :	6
7	Rebound 51	7
7	Windmill	8
7	Burke's Barrage Inside	8
7	The classic three ball machine: [4 2][4x2][4 2x]	8
8	441	4
8	4413, 441522 and 44142	4
8	52512	4
8	Cross arm columns	5
8	43 2 3	6
8	53 1 2 1, a shower	6
8	54 1 4 0 4 2 1, another three prop pattern	6
8	[4x4 2][4x 2]*	6
8	Mill's mess Three props	8
9	51 with a Multiplex	3
9	4440(3)	4
9	Rebound 7131	7
9	Rebound 633 and 83333	7

9	Five count MM	8
9	Four and other even counts	8
9	Symmetric machine	8
10	4 balls	2
10	The statue of liberty	3
10	42x*, The box	5
10	Rebound pirouette through double bounce columns	7
10	Rebound 64x*, the five ball column pattern	7
10	Mill's mess 423c	8
10	Mill's mess (4,3)24(2,2)3 or (4,3)24(2,2)4(2,2)3	8
10	Four count machine	8
11	4x2x 42x The double box	5
12	4 Wall	2
12	5511	4
12	6420(3)	4
12	552(4), The four ball exchange	4
12	54 2 1 (oleil)	6
12	Boston Mess three props	8
13	4 Slow pirouette	2
13	Asynchronous Rubenstein's revenge	8
15	3 Juggling above the head	2
15	7 1 3 1, the two headed three ball shower	3
15	7 1 3 1 5 1, the three headed three ball shower	3
15	51 Crossed arms	3
15	51 Backcrosses and back-snaps	3
15	423 with a thrown 2	4
15	531	4
15	45123 (12345)	4
15	552	4
15	(3,3) (3,3) 3 Two extra balls :	6
15	43 5 5 2 1	6
15	43 4 5 2 2	6
15	54 5 1 2 3	6
15	54 2 4 2 3	6
15	75 1 2 1	6
15	[2x4 2x][22 4][22 4]* barrage	6
15	4x4x4 0 4x0 4x22	6
15	Rebound 4x2* with bounced 2	7
15	Rebound 53	7
15	Mill's mess 423a	8
15	Mill's mess 423b	8
15	Mill's mess 44133a	8
15	Mill's mess 531c	8
15	Mill's mess (4,3)1421c Crossed and Open five count	8
15	43 1 3 3 4 2 1	8
15	Synchronous Mill's mess [4 4] [4x0]	8
15	Backstroke	8
15	Three prop two count barrage: [4x2]*a	8
15	Barraged (3,4) 2 4 (2,2) 3 a	8
15	Rubenstein's Revenge: [4 2][4x2][2 4x]*	8
15	RR Small barrage (balls)	8
15	Orbit machine	8
16	55550(4) The double exchange	4
17	[4 2][2x (4x,4x)][2x 4]*, a four ball double box	6
18	Rebound Five ball passive cascade:	7
18	Mill's mess 441b	8
18	Mill's mess 441c	8
20	4x4x Two plane synchronous cascade	2
20	3 Juggling while laying	2
20	71 The four ball shower	3
20	7 1 7 1 1 1, showers with consecutive 1's	3
20	53, the four prop half shower	3
20	5344	3

20	522 weave	4
20	531 Reversed 31 (balls)	4
20	552 Weave (balls)	4
20	55244 and 55253	4
20	5551	4
20	53(4)	4
20	53 the half shower	4
20	642	4
20	642 Columns	4
20	42 4x2 Backstroke	5
20	42 4x2 Crawl	5
20	42 4x2 Knitting (Clubs > balls)	5
20	62*	5
20	53 2 2	6
20	62 2 5, Martin's	6
20	[4x4 2]*	6
20	Rebound 8040, partial rebound three in one hand	7
20	Rebound Four balls active	7
20	Reverse Mill's mess	8
20	Mill's mess 441a	8
20	Mill's mess 53133a	8
20	Mill's mess 531b	8
20	Synchronous Mill's mess [4x 0][4x4x]	8
20	Four prop multiplex barrage	8
20	Expanded Rubenstein's Revenge	8
22	5344	4
22	Mill's mess 531a	8
22	Mill's mess (43) 4 5 2 2	8
23	53444 Four ball tennis	4
24	Rebound 8552, (6)852(4) and 88522	7
25	3 Juggling under an armpit	2
25	3 Classic half pirouettes	2
25	3 onepause half pirouette	2
25	3 Backcatch half pirouette	2
25	575151	3
25	441 penguin variation(balls)	4
25	531 Clawing a high 3 (balls)	4
25	55500 Three ball flash	4
25	55050 the snake (50505)	4
25	534 Popcorn	4
25	575151	4
25	[4x4 2x][4x 0][2 2]*, a barrage	6
25	4x4x4 2 4x2	6
25	Rebound 60, Three in one hand in Columns	7
25	Rebound 10 5 5 5 5 0 and 10 5 0	7
25	Rebound 55525(5,3)555… and (5,3)23	7
25	Rebound (7,3)23 and (9,3)5521	7
25	Mill's mess (4,3)23a	8
25	Mill's mess (4,3)23b or c	8
25	Double drop machine with 3 balls	8
27	Rebound 95551	7
28	6334	4
30	3 Double half-pirouette	2
30	4440(3) around the body throw	4
30	4440(3) armpitcatch	4
30	522 "The shoulder-drop"	4
30	52512 Backdrop variation	4
30	4560123 (0123456)	4
30	60 three in one hand	4
30	55514	4
30	534 Reverse	4
30	561	4
30	62 Three in one hand	4

30	737313	4
30	42x Cross box, (Caja de Marco)	5
30	6442 family	5
30	66 2x2x	5
30	33 33 33 Double three ball cascade :	6
30	[(4x,4x) 2x][2 4x], barrage between the couple.	6
30	[(4,4) (4,4)] [4x 0]*, five prop column pattern	6
30	54 2 4, the basic five prop ASS multiplex pattern	6
30	43 54 5 2 2, the basic Vesuvius	6
30	[6x4x 2]*	6
30	Rebound 6x2x, the four ball shower	7
30	Rebound 6x2x*	7
30	Rebound 933	7
30	Mill's mess 3 Penguin	8
30	Mill's mess 441a reverse	8
30	Boston mess machine	8
30	Boston Mess four props	8
30	Synchronous Mill's mess [6x4][20]*	8
30	Barraged (4,3)23 a	8
30	Self drop machine	8
35	5 balls	2
35	3 Juggling around a shoulder	2
35	3 Blind juggling	2
35	9 1 5 1, The two headed four balll shower	3
35	53, Reverse low throw, normal high throw	3
35	7333	3
35	72313	4
35	(60)5050560(60) or [60][6x0][6x0][6x0][06]	4
35	1234560	4
35	64514 and 56414	4
35	7441	4
35	633, Rockets	4
35	42x Luke's shuffle	5
35	82x 42x 2x0 The split box.	5
35	Backcatch variation (4x4x 4x0)	5
35	Armpit variation ([44][4x0][44][04]*)	5
35	6424 with pause use	5
35	62x 62x* The four count box	5
35	62x 62x 62* box	5
35	6x2 62x* box	5
35	64 6 1 2 1	6
35	Rebound Five ball active cascade:	7
35	Mill's Mess four	8
35	Mill's mess (4,3)4423a	8
35	Ultimate machine (two count -) [4x2x]	8
35	Double drop machine (4 balls)	8
35	Couple machines (4 balls)	8
36	9 1 5 1 7 1, The three headed four ball shower	3
36	Mill's mess (3,3)33 to 4	8
37	11 1 5 1 5 1, Two balls jump the queue	3
38	63353	4
38	7333	4
38	4 ball Revenge: Two holding barrage [(4x,4)2][4(2,2)][4x(2,2)]	8
40	4x4x 44 Scissors	2
40	3 Classic full pirouettes	2
40	11 1 7 1 3 1, One ball jumps a ball that jumps the queue	3
40	9 1 9 1 3 1, One ball jumps to other balls and	3
40	747141(4) and 74714147441	3
40	[6x4x]*, the S five prop half shower	3
40	441 high snap	4
40	6161601	4
40	8040 Columns	4
40	7531	4

40	6631	4
40	642 with a thrown 2	4
40	635613	4
40	7333444	4
40	53633733	4
40	7441, 74414 and 7441444	4
40	7471414	4
40	723	4
40	741	4
40	42x High to low snap box	5
40	6424 other side catch	5
40	6x2x* The two count box	5
40	[(4,4) 4]*	6
40	[(4,4) 2x]* , a five ball box.	6
40	2 5 53 and 2 5 2 5 543	6
40	Rebound 534	7
40	Rebound Five ball double bounce reverse active cascade	7
40	Rebound 6x4x	7
40	Rebound 6 Passive synchronous cascade	7
40	Mill's mess 534c	8
40	Four prop Burke's barrage: [6 2][6x2][6x2]*a:	8
42	4 ball Revenge: One holding barrage : 2 (4,3) 4 5 2	8
43	Mill's mess 55514c	8
43	Four prop four count barrage: [6x2][6x2]*c	8
44	Rebound 74707	7
45	11 1 11 1 3 1 3 1, Two balls jump to other balls	3
45	11 1 5 1 9 1 3 1	3
45	5671234	3
45	8040, double heade three-in-one hand	4
45	633 Machine	4
45	66161	4
45	6611The wall	4
45	75161	4
45	6461641	4
45	5561551	4
45	7531	4
45	723 weave	4
45	714	4
45	64(5)	4
45	6x4*	5
45	64	5
45	switch from rebound 5 to to cascade 5	7
45	Rebound 6x4*	7
45	Rebound Seven	7
45	Mill's mess 534	8
45	Mill's mess 534b	8
45	Mill's mess 552	8
45	Mill's mess 633c	8
45	Mill's mess 56414c	8
45	Synchronous Mill's mess [4 4][4x4x]	8
45	contact ball variation	8
45	contact ball mach	8
45	Asynchronous machine 633	8
50	522 hand flip	4
50	5671234	4
50	831	4
50	666660 and 6662	4
50	66661	4
50	77722(5) and 7777700(5)	4
50	4éx High snap box	5
50	82x 42x* The split box	5
50	64x*	5
50	6 (4,4) (2,2), a six ball pattern	6

Clubtricks

10	Fake Mill's Mess	8
12	3 Backcross quarter pirouette	2
13	42 columns	4
14	spinning shower	3
15	4x2 The weave	2
15	3 Crossed arms	2
15	51,three ball shower	3
15	42, Two in one hand	4
15	42 cascade	4
15	423 Weave	4
15	522	4
15	42, two in one hand	5
15	[44] [40] and [44][4x0]*, Columns	5
15	43 0 3 2 3	6
15	Mill's mess Three props	8
16	4440(3)	4
16	52233, 52242	4
18	3 clubs triples	2
18	4x2 Chops, Drop swing (Clubs)	2
20	4x2 Flourish, Flip, Loop	2
20	51 with a Multiplex	3
20	42 reverse fountain	
20	441	4
20	4413, 441522 and 44142	4
20	42 Loop (clubs)	5
20	42x*, The box	5
20	43 1 4 2 1	6
20	53 1 2 1, a shower	6
20	Five count MM	8
20	Four and other even counts	8
20	Boston Mess three props	8
25	4x2 Half flick	2
25	3 Juggling above the head	2
25	4 Wall	2
25	423 with a thrown 2	4
25	522 weave	4
25	(3)522 Two flourishes (club's)	4
25	6420(3)	4
25	42 The body cross swing (clubs)	5
25	42 Helicopter (clubs)	5
25	Three prop Burke's Barrage: [4 2][4x2]*a	8
25	Backstroke	8
30	4 club doubles	2
30	3 Juggling under an armpit	2
30	3 Juggling while laying	2
30	3 Classic half pirouettes	2
30	3 onepause half pirouette	2
30	3 Backcatch half pirouette	2
30	51 open shower	
30	7 1 3 1, the two headed three ball shower	3
30	7 1 3 1 5 1, the three headed three ball shower	3
30	7 1 7 1 1 1, consecutive 1's	3
30	51 Backcrosses and back-snaps	3
30	open shower (soleil) 51	3
30	52512	4
30	531 triples	4
30	5511	4
30	45123 (12345)	4
30	42 4x2 Backstroke	5
30	42 4x2 Crawl	5
30	(3,3) 3 3 One extra ball :	6
30	75 1 2 1	6
30	Mill's mess 3 Dip clubs	8

30	Rubenstein's Revenge: [4 2][4x2][2 4x]*	8
30	Asynchronous Rubenstein's revenge	8
35	4 clubs singles	2
35	4 Slow pirouette	2
35	53, the four prop half shower in triples	
35	5344	3
35	531 doubles	
35	55500 Three ball flash	4
35	552(4), The four ball exchange	4
35	552	4
35	53(4)	4
35	53 the half shower	4
35	642	4
35	642 Columns	4
35	42 4x2 Knitting (Clubs > balls)	5
35	42 4x2 Two swings (clubs)	5
35	43 2 3	6
35	[4x4 2][4x 2]*	6
35	Mill's mess 44133a	8
35	Burke's Barrage Extra swing	8
35	Expanded Rubenstein's Revenge	8
36	Reverse knitting	8
38	5344	4
38	Mill's mess (43) 4 5 2 2	8
40	4 clubs triples	2
40	3 Juggling around a shoulder	2
40	3 Blind juggling	2
40	3 Double half-pirouette	2
40	71 Four ball shower	3
40	53, the four prop half shower in doubles	3
40	575151	3
40	4440(3) around the body throw	4
40	4440(3) armpitcatch	4
40	522 Double flourish	4
40	522 "The shoulder-drop"	4
40	52512 Clubs loop variation	4
40	52512 Backdrop variation	4
40	55050 the snake (50505)	4
40	552 Weave (balls)	4
40	5551	4
40	55550(4) The double exchange	4
40	53444 Four ball tennis	4
40	534 Popcorn	4
40	575151	4
40	62*	5
40	54 2 1 (oleil)	6
40	54 5 1 2 3	6
40	Mill's mess 423a	8
40	Mill's mess 441a	8
40	Synchronous Mill's mess [4 4] [4x0]	8
41	54 2 4 2 3	6
45	7333	3
45	72313	4
45	531 soleil: clubs in shoulder plane:	4
45	4560123 (0123456)	
45	552 Flourish (clubs)	4
45	55244 and 55253	4
45	561	4
45	Backcatch variation (4x4x 4x0)	5
45	Armpit variation ([44][4x0][44][04]*)	5
45	6442 family	5
45	66 2x2x	5
45	Mill's mess 441a reverse	8

45	Mike's Mess	8
45	Synchronous Mill's mess [4x 0][4x4x]	8
50	4x4x 44 Scissors	2
50	423 Joris high club variation	4
50	55514	4
50	633, Rockets	4
50	6334	4
50	63353	4
50	42x Cross box, (Caja de Marco)	5
50	(3,3) (3,3) 3 Two extra balls :	6
50	[(4,4) (4,4)] [4x 0]*, five prop column pattern	6
50	Mill's mess 3 Behind the back	8
50	Mike's Mess 72222	8
50	Synchronous Mikes mess	8
50	Synchronous Mike's Mess	8
55	5 club doubles	2
55	7333	4
55	7441, 74414 and 7441444	4
55	6424 with pause use	5
60	5 clubs triples	2
60	3 Classic full pirouettes	2
60	64514 and 56414	4
60	723	4
60	6424 other side catch	5
60	Mike's Mess Half pirouette	8
65	53 Soleil, Open half shower	3
65	7531	4
65	6x2x* The two count box	5
65	Four prop Burke's barrage: [6 2][6x2][6x2]*a:	8
70	5 clubs singles	2
70	71 open shower	
70	open shower (soleil) 71	3
70	[6x4x]*, the S five prop half shower	3
70	642 flick (clubs)	4
70	64(5)	4
70	42 4x2 Jochen's [42][4x2]*	5
70	Shoulder mill	8
75	33 33 33 Double three ball cascade :	6
75	Mill's Mess four	8
80	Mike's Mess 822	8
80	Synchronous Mill's mess [4 4][4x4x]	8
80	Rubenstein's revenge behind the back (clubs)	8
90	64, 645 and 64645	4
100	60 three in one hand	4
100	62 Three in one hand	4
100	744	4
100	771	4
e	6 clubs	2
e	7 clubs	2
e	73, the AS five ball half shower	3
e	75, the AS six prop half shower	3
e	8x4x, the S six prop half shower	3
e	(60)5050560(60) or [60][6x0][6x0][6x0][06]	4
e	6161601	4
e	1234560	4
e	8040, double heade three-in-one hand	4
e	8040 Columns	4
e	10 0 4 0 4 0, 10 0 6 0 2 0,	4
e	66161	4
e	6611The wall	4
e	7070707 The four prop snake	4
e	80 Four balls in one hand	4
e	663	4

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