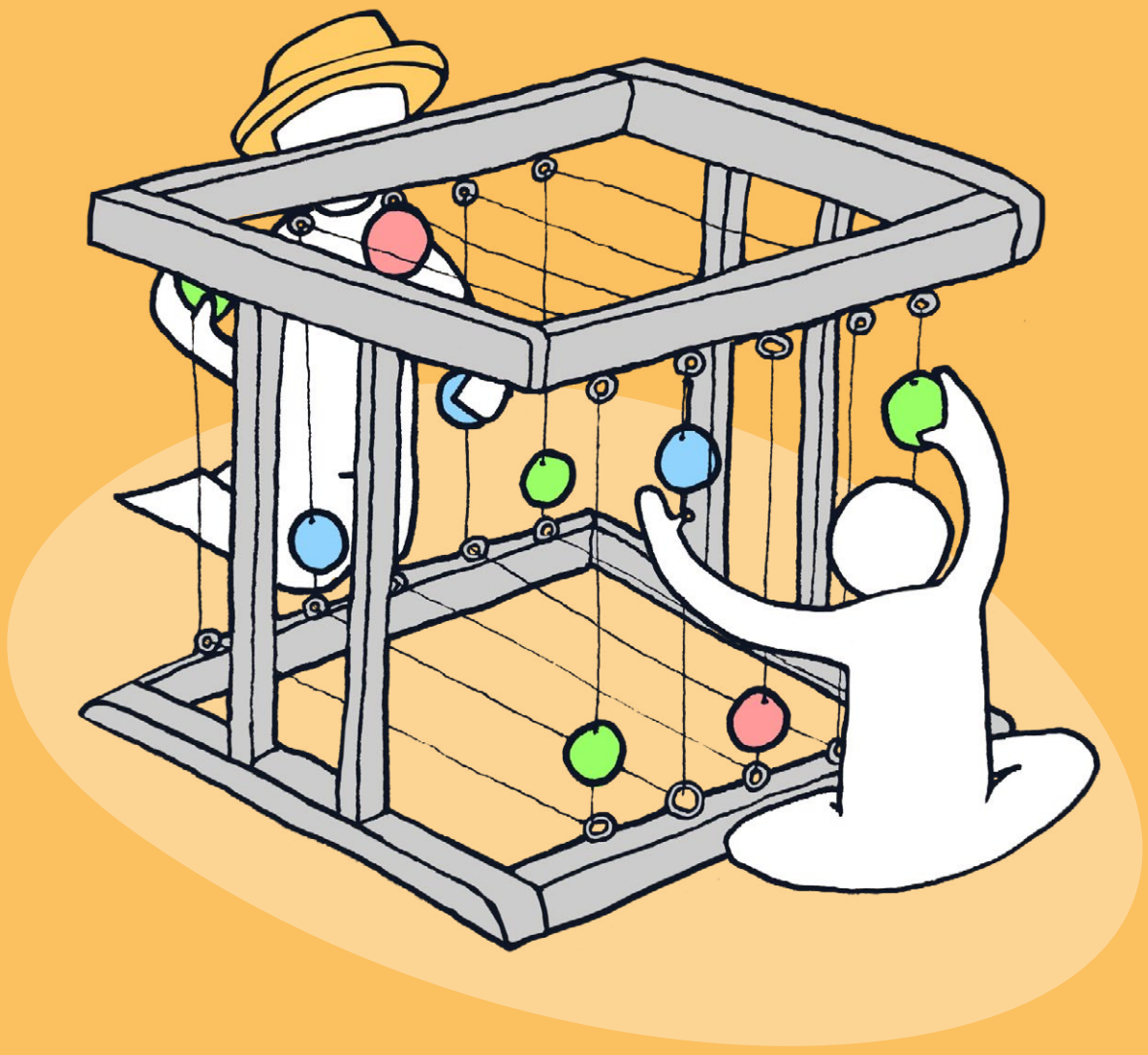
QUATPROPS

FUNCTIONAL JUGGLING

A BOOK ABOUT JUGGLING

BY **CRAIG QUAT**



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BY CRAIG QUAT

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The concepts of *Functional Juggling* would not exist without the collaborative efforts, support, and friendship of thousands of beautiful people from around the world. Here I will take a moment to recognise just a few of these people, but stress that there are many more who have participated in this journey with me. From every person who has ever picked me up from a transit station, or given me food, clothes, and a place to sleep; you are the largest and most important group of people to thank first. Without you, I would be lost.

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CHAPTER 1
WHAT IS JUGGLING?

If it is our goal to increase the accessibility of juggling for everyone, then we should begin by establishing what we mean to describe by the word juggling. This is because understanding clearly what the thing is that we are trying to share, will better enhance and guide our ability to further develop its educational models. Deciding what it actually means to juggle, however, can be a challenging task with some considerably difficult barriers to overcome.

There are many different interpretations of juggling, with the main idea being that it is something we consider by the qualitative values of its physical expressions alone: throwing and catching, for example. Now, this way of understanding may seem obvious at first, but it fails to recognise any of the underlying relationships between the outcomes of its interactions, and shows no consideration for the manner in which we are affected by the experience itself.

By default, this interpretation imposes a limitation on the total amount of ways that juggling can ever be expressed. Trying to understand juggling in this way makes for long, complicated, and controversial explanations of the idea. This is because it becomes necessary to document a long list of all the possible expressions which we subjectively consider to be (or not to be) juggling.

Poi, for example, is certainly recognised as "object manipulation", but not everyone would agree that poi is juggling. This is because it deeply depends on which cultural interpretation of the idea each person selects to determine its value. If we were to evaluate the activity based on our list of its expressions alone, and if the actions of poi were not on that list, then our understanding of it would be to think that poi is not juggling. Alternatively, if we were to look at poi from the perspective of its sequencing relationships with space and time, and the states of mind which those interactions relate to, then our understanding of poi would be to think that it is juggling.

Juggling cannot and should not be defined by the outcomes of its physical expression.

To describe juggling in such a way is to attempt to define all of music by one instrument, or all of dance by one style. This cultural error of trying to understand juggling as action, as opposed to states of relationships between actions (in the same way that we do with music or dance), is what causes juggling to become so inaccessible to so many people in the first place.

If we continue to define juggling in this way, then we inherently alienate anyone outside the current sphere of its cultural predetermination.

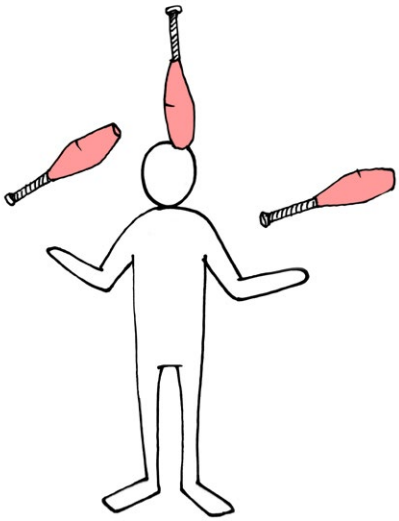
In order to overcome such barriers, we will need to learn to look at juggling in a new way. This is a process which begins by deconstructing our principles of what juggling can or cannot be, and recreating its experience, in whatever image, of the activity we can imagine.

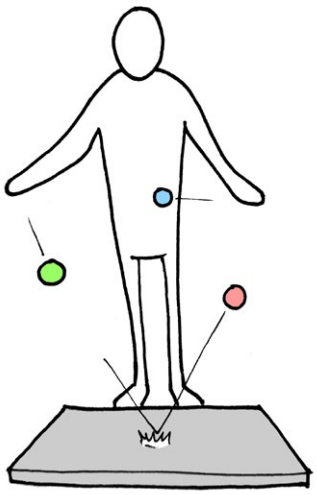
Let us begin.

CHAPTER 2
EXPRESSION VS. EXPERIENCE

So, if we are not to understand juggling in terms of its actions, then in what other ways can it be understood? For this, we should consider making a distinction between the **expression** and **experience** of its activity.

Now, it is possible to change an expression of something without necessarily changing its experience, but it is not possible to change the experience of something without affecting the outcome of its expression. For example, a 3-object cascade is the same experience regardless whether it is performed by bouncing balls or throwing clubs.





Certainly, changing the technique of an activity changes the outcome of its expression, but it does not alter any of the relationships of the experience itself. The experience of a cascade remains the experience of a cascade, no matter how much or how many times we change the form of its expression. In this way, we can say that an expression of juggling describes only its action, whereas the experience of juggling describes its universal state of relationships between actions.

Expression	**Experience**
Action or medium used to produce the experience	Universal state of interaction, not related to outcomes of its expression
(Subject to change)	(Not subject to change)

This separation of experience from expression helps to clarify some of the general controversies and misunderstandings we have about juggling from the start. The point, here, is to try to think about juggling in a different way - not to explore what makes it different from itself, but to navigate what makes it the same. In other words, we want to evaluate which universal conditions of juggling are present in all forms of its expression, and which ones are not.

Describing juggling in this way means to consider it from both its internal and external perspectives.

- **Internally**, what are the communication and sequencing relationships it allows us to form?
- **Externally**, what are the sensory dialogues it creates with space and time?
- And **holistically**, what other states of mind does it describe?

CHAPTER 3
FORMULA SOLUTIONS

Thus, *Quat Props and the Functional Juggling Community* propose the following description as a formula solution to answering the question: what is juggling?

"A managed anti-entropic sequence of orbital events, harmonised by space and time."

Note, this description does not attempt to define the meaning of juggling (meaning is subjective). Instead, what it tries to do is describe the smallest possible combination of the sensory and sequencing relationships associated with the state of mind that we recognise as being juggling.

This description can be thought of in four parts.

1. *A Managed*
It might seem obvious and unnecessary to explain, but technically, nothing can be experienced without being experienced. So, it goes to say, that any experience of juggling will always include some "managed" form of its own expression.

2. *Anti-Entropic Sequence*
This is a fancy way of saying a structured pattern of events that repeats itself. The term anti-entropic is used because it describes an element of our sensory relationship with space and time.

Entropy is a condition of the universe that moves it from states of order to disorder. This constant change of space, from our perspective, is what allows us to create our linear sense of time. Like a story, it progresses with a clear direction of forward (future) and backwards (past). Time, like space, is a dimension. We may not always think of it this way, but mathematically and scientifically, that is reality. Although we are unable to escape the universal force of entropy, we are able to distort some of our sensory relationship with it.

Anti-entropic sequencing behaviour repeats itself, which reduces the overall amount of reference we have to changes in space, over time. Reducing reference to change in space, also reduces our ability to be aware of linear time within that space. This does not necessarily prohibit us from continuing to process entropy, but it does lower some of our ability to be aware of its progressions.

3. Of Orbital Events
In order to form a sequence of events, we need events to sequence with. In the case of juggling, we describe these types of events as being orbital. Describing an event as orbital is another way of saying that it has a start point which is the same as its end point.

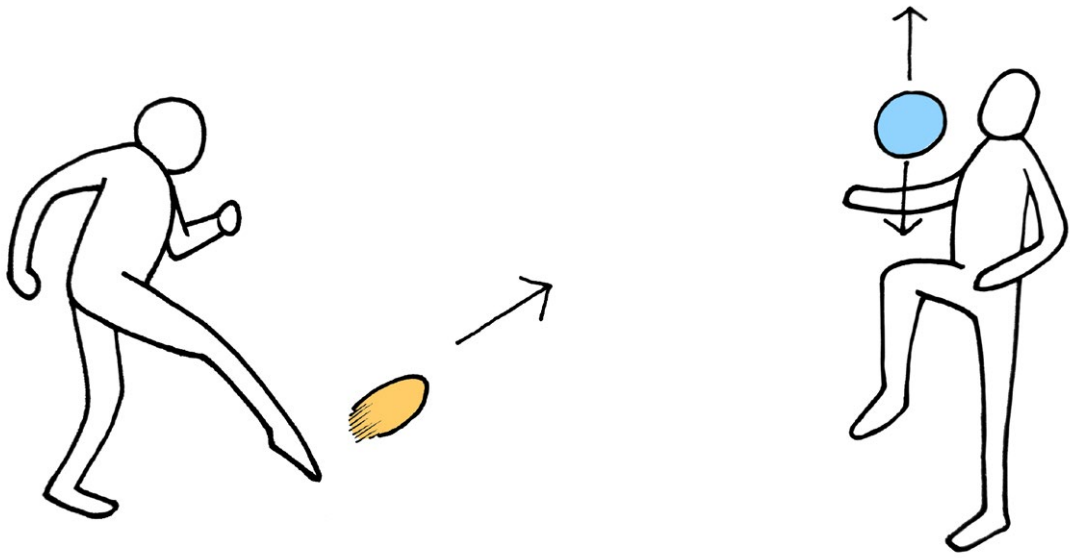
An object that travels through space also travels through time, and it is this fractal layering of orbital events, within orbital anti-entropic sequences of events, which further acts to distort our

sensory relationship with it. This may sound like a strange sensation to some, but many of us are already familiar with its unique stimulations, as it is the same formula we use to construct things like music and dance.

4. Harmonised by Space and Time

One of the more unique things we can say about juggling is that its tempo (or frequency of action) is not determined by a juggler, but rather, by the relationship that a juggler forms with the juggling. This is a strange concept of sensory interaction, which is easier to explain in comparison to some traditional factors of classic sport.

One of the most common intentions of classical sport is the ultimate release of energy or power. To hit the hardest, to jump the highest, or to run the fastest. This emphasis of energy release focuses its point of sensory communication as an outward value, and promotes a linear dialogue with spatial information. Basically, it creates a situation in which more information is being communicated out into space, than is being processed or received from it. Not only that, but the linear structures of traditional sport do not provide nearly as much opportunity to collect sensory feedback information about their experiences, as do the orbital events of juggling.



In order to experience juggling, one must learn to process and adjust to its constantly changing flows of sensory feedback information. This is very similar to the way that a musician responds to the sensory feedback information of sound whenever they play their instrument.

CONCLUSION

Although somewhat wordy and abstract in its explanation, this definition is not intended to be confusing. Ultimately, as we learn to apply its meaning in more relevant contexts, we should be able to look back on it as a simplified equation of juggling's experience.

This description of juggling is very different from many other interpretations of the idea, and is not expected to be fully understood, or appreciated, until after much deeper examination of its practical applications.

CHAPTER 4
GLOBAL ACTIVATION

LINEAR VS. NONLINEAR PROCESSING

Whether or not we agree on the specific terms of what makes something juggling, or not, is not so important. What is important, is that we recognise its science, which tells us that juggling represents the stimulation of a very unique state of mind.

A juggling mind is not a normal mind.

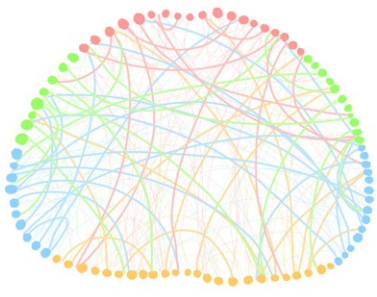
It uses different sequencing tasks to process information than would otherwise be possible under linear conditions.

If we were to imagine the brain as a complex system of interconnected roadways, we could expect to see certain linear patterns of traffic emerge in relation to our most common sequencing tasks. These linear states of mind can be thought of as having a point A to point B relationship with information. For example, 2+2=4 is a linear equation; it works in the direct manner of cause, effect, and outcome. It follows an order of understanding that says first this, then that, which leads to another. This linear ordering of information mirrors the same entropic principles responsible for ordering our relationship with time.

The brain can only process information in relationship to the way that it processes time. If time is processed linearly then information is processed linearly, as well. Although this is an effective tool for helping us to function within certain dimensions of our own reality, it is not the only way we have to process information.

As we described earlier, juggling is a sensory activity which involves the mild distortion of our relationships with space and time. This subtle change to stimulation may seem small on the surface, but underneath it has a profound effect on the way that we are able to interact with and process information. This altered state of mind can be recognised by its hyper, yet fluid, states of communication, and is what we refer to as global activation. Under such conditions, we observe cross regional communications taking place all over the brain, at the same time. This is also something we recognise as being part of a flow state or meditation.

LINEAR MIND



NON LINEAR MIND

To process information globally means to process without intention or reference to position in time. These states of mind are unique in that they allow more information to be processed simultaneously, over broader networks of divergent schema. Although juggling is not alone in its ability to stimulate this state of mind, it is one of the more direct and concentrated means we have for activating the experience.

Yes, juggling increases brain mass and improves executive functioning capacity, as well as a long list of other things, but it is not the overwhelming list of its benefits that we wish to discuss here in this book. Rather, our interest is in trying to uncover the rawest possible formula of its stimulation, so that we may better transfer the outcomes of those benefits to more people. In this way, we see juggling as being the means to its cause, but not as the cause itself. Cause relates to the beneficial outcome of an activity's experience, and in the case of juggling, these outcomes most certainly relate to its stimulation of global activation.

CHAPTER 5
ACCESSIBILITY

WHAT ABOUT SKILL?

It has been observed, to some surprise, that the overall cognitive impacts of learning to juggle are not necessarily associated with the development of its skill level. This means that when observing an overall increase in brain mass, people having higher skill levels do not show greater benefit than those having lower (relative to their individual experiences). The cognitive impacts of learning to juggle are correlated to the amount of time a person spends engaged with the activity, and not the individual level of skill which they develop in the process. This varies greatly from our expectation of traditional sport, where similar levels of impact can take up to 3 to 4 times as long, since they do not stimulate states of global activation.

This strange condition of none associated skill level describes another unique quality about juggling that perhaps makes it even more accessible than the transformation of its physical conditions alone. It means that if you experience juggling for one hour, then you receive one hour of its benefits regardless of personal skill or ability. This puts juggling in another accessible category of activities like meditation and yoga, where similar properties can be observed. This is because the outcomes of such experiences are relative to the states of mind that they produce and not the means of action used to create them.

Juggling, when defined in classical terms of throwing and catching, has limited accessibility because of the level of technique it requires in order to access its experience. However, the action used to express juggling does not relate to its condition of global activation, which, thereby, makes it irrelevant to the creation of its experience. Meaning that we are free to change the activity, in whatever way that we desire, so long as we preserve the order of its relationships with space and time.

CHAPTER 6
EDUCATION

EXPERIENTIAL VS. NONE EXPERIENTIAL LEARNING

If we understand juggling to be a positive tool for the rapid development of new communication structures within the brain, and are aware that school systems around the world are currently searching, specifically, for this type of intervention, then we should be asking ourselves: why is it that juggling has not already become a more normalised part of mainstream education? This is a critical question, because the conceptual benefits of learning how to juggle are not only well known, but also highly desired by the rapidly changing needs of modern society.

There is no confusion or doubt over the unique benefits juggling has to offer, but there are some concerns over its perceived levels of inaccessibility. Certainly, any school system would be delighted to have their students benefit from the unique impacts of learning how to juggle. However, because it is not considered accessible for everyone, it fails to meet the criteria for universal implementation.

In society, the general perception of juggling is that it requires a lot of natural ability or talent, and that it is not something everyone is able to do. This assumption reflects poorly on the accessibility of juggling, and is not entirely untrue. This is because, historically, strict cultural interpretations of its expression (throwing and catching) have, in fact, made the activity quite inaccessible to a lot of people. Quantifying its value in this way discriminates against anyone not physically or cognitively able to perform such action, which, based on the outcomes of our classical teaching models, would suggest to include a majority of the people on the planet.

Yes, based on previous definitions of juggling, it has not always been accessible. But, this does not mean that juggling itself is inaccessible, or that we are not able to improve upon its levels of accessibility going forward.

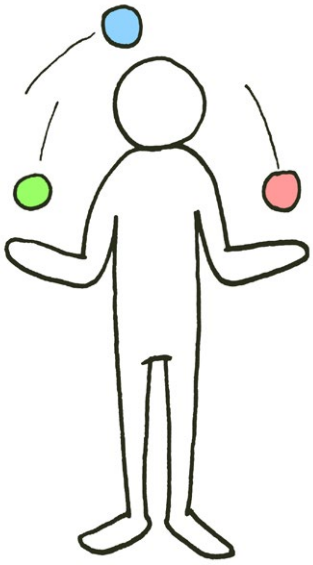
When it comes to the misappropriation of learning models in terms of classical juggling education, there are primarily three pillars of inaccessibility.

1. HOW WE CHOOSE TO DEFINE THE OUTCOMES OF ITS EXPERIENCES.

Juggling is not the condition of its action. Its outcomes reflect those of the relationships it allows us to form with space and time. Thus, determining the values of its experience based on the products of its personal expression is not only wrong, but also discriminatory. In doing so, we produce an unnecessary level of challenge for being able to access the activity, and at the same time institute a cultural misconception about what it means to juggle.

2. WHERE WE CHOOSE TO DETERMINE THE START POINT OF ITS ACTIVITY.

Typically when we say that we are going to teach someone to juggle, what we really mean is that we are going to teach them to do a 3-ball tossing cascade.



There is no particular reason why we must begin to learn to juggle using this activity; however, at some point in our cultural history, it did become the standard model of most educational practices.

While there are no shortage of people ready to defend this idea, with cultural claims of tradition (as it always is, because it is the same way that it was taught to them) there are no real justifications for setting such absurdly high and inaccessible levels of entry for any new activity. This would be like requiring all new students of music to begin by practicing *Mozart* on violin, instead of something more reasonable like "Three Blind Mice," on the recorder. It simply does not make sense, if the true goal is to be able to share the activity with more people.

Considering how music and juggling both stimulate states of global activation and require similar capacities to be able to perform, it can be valuable for us to reflect on the ways that they differ in terms of their accessibility.

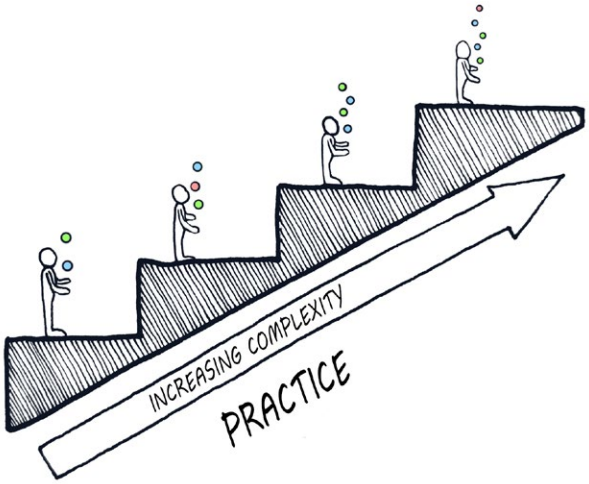
Music, despite its similarities to juggling, is recognised as being highly inclusive and accessible to everyone. The challenges of learning to play music are no less than those of learning how to juggle; however music, unlike juggling, makes no attempt to predetermine its start point or limit the possible values of its expression. One can begin to explore music through a variety of ways and even produce their own unique forms of expression in the process.

Juggling, on the other hand, predetermines that its initial engagement can only be accessed through the narrow interpretation of a 3-ball tossing cascade.

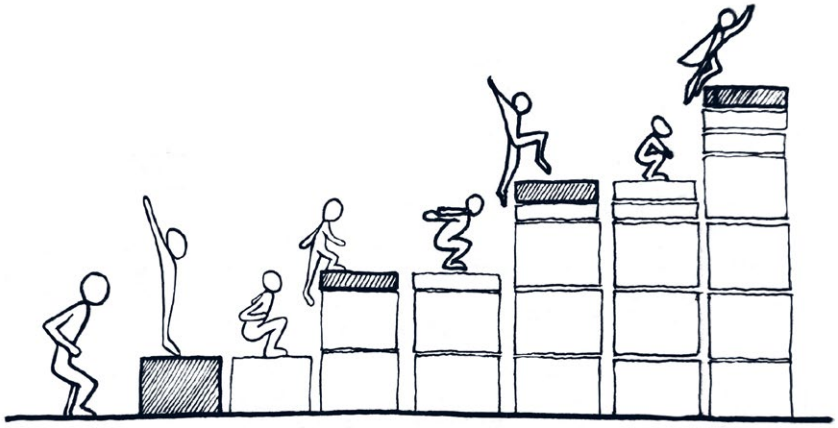
Obviously, if we choose to limit the possible forms of its expression and prevent the open exploration of its idea, then we should expect to see nothing less then the overall limitation of its accessibility.

3. THE MODEL OF LEARNING WE APPLY TO DEVELOP ITS CAPACITY.

The classical model of learning to juggle uses a process known as **scaffolding**. It works by taking the outcome of a goal, let's say the ability to jump 1-meter high, and divides it up into smaller goals which then follow a linear path of progression, from point-A (start) to point-B (finish).



For developing a capacity to be able to jump 1-meter high, we would begin with a much smaller goal, for example 20-centimetres. Following mastery of this skill, we would continue to develop its capacity, incrementally, all the way until we reached a height of 1-meter.



What's important to understand about this model is that although it works well for developing linear capacities, like increasing the height of a jump, it is not the most appropriate way to teach someone to juggle. This is because scaffolding is a linear model of learning, which requires the experience of its own activity as part of the learning process.

A student that practices jumping is able to use scaffolding, because increasing the height of a jump does not change the outcome of its experience. However, when we define the start point of juggling as a 3-ball tossing cascade, we prohibit effective scaffolding because there is no way to structure the experience of its activity into our personal process of learning how to do it. Meaning, that a person is either juggling the 3-ball tossing cascade, or they are not, and there is nothing in between.

Not being able to experience something as part of its own learning process certainly makes it more difficult to learn; however, juggling is not alone in this capacity. In fact, many traditional sport activities embody this same quality of inaccessibility.

Take for example, the challenges of learning how to swim or ride a bicycle. Most people are able to do at least one of these activities, and yet, they share this same quality with juggling of not being able to be experienced as part of their own learning processes. If a person wanted to try to ride a bicycle, but did not know how, they would fall over and probably receive some injuries. In this same way, if they also wanted to try to swim, but were not yet able to do so, they would experience drowning, instead.

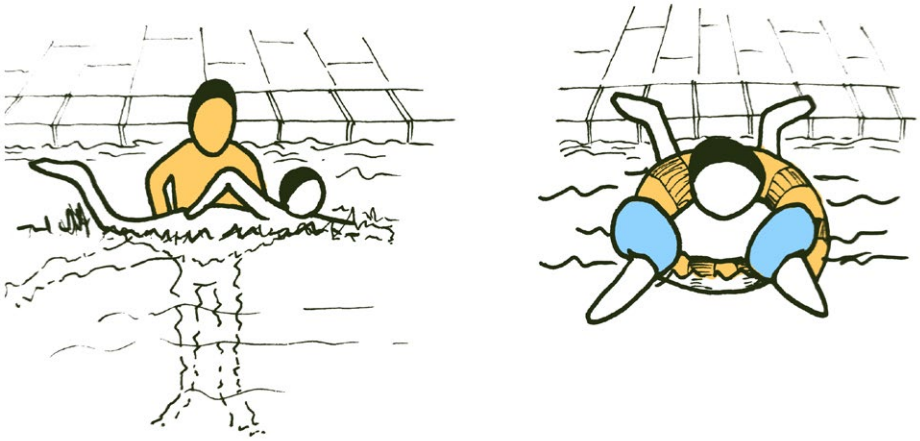
Clearly, in these circumstances, the consequences of failure are much higher compared to the risk of learning how to juggle; however, the nature of their inaccessibility remains the same. It is not possible to experience swimming, without being able to swim, nor is it possible to experience bicycling without being able to bicycle; and yet, both of these activities are widely accessible to many people, whereas the experiences of traditional toss juggling are not.

This is because, for swimming and bicycling, we correctly apply a non-linear (experiential based) model of learning, whereas for traditional toss juggling, we incorrectly apply a linear (non-experienced based) model of scaffolding. Applying linear scaffolding to the challenge of learning a 3-ball tossing cascade transforms its experience into an outcome based model of learning. Meaning that the experience of its activity becomes the outcome or reward of its own learning, as opposed to being part of its developmental process.

To overcome these challenges, swimming and bicycling utilise a variety of simple low tech solutions, which can enable sensory experience of their activities as part of their own learning process. For bicycling, this includes things like the help of another person, to prevent us from falling over.

Another way to provide this type of support is through the use of adaptive learning tools, such as training wheels, which are intentionally designed to allow the experience of bicycling as part of its own learning process.

For swimming, the same strategies of receiving support from another person and the use of adaptive training tools, such as floatation devices, can also be applied.



Collectively, these solutions work together to provide as much sensory access to their own experience as part of the learning process.

Imagine how difficult and dangerous it would be if everyone had to try to learn to swim or ride a bicycle without the use of adaptive training tools or the cooperation of another person. Far fewer people would be able to overcome the barriers of this learning obstacle, and those who did, would only have done so by risking their emotional and physical safety in the process. The point, here, is that this is neither a healthy nor constructive way to develop any learning capacity; let alone that of juggling.

In order to overcome these barriers, we must learn to emphasize the value of juggling's experience over the cultural predeterminations of its expression. As we embark on this journey, we will begin to move further and further away from our traditional understandings of what makes something juggling. In doing so, we will need to redefine and establish a new set of parameters by which to evaluate its experiences, and this is where the concept of *Functional Juggling* comes into play.

CHAPTER 7
FUNCTIONAL JUGGLING

In the context of *Functional Juggling*, we will be applying a formula of solutions about juggling to the transformation of its expressions.

What determines something about juggling to be functional, or not, is based on the intention of its interaction and not that of its design. Interactions with juggling are considered to be functional whenever there is an intention to develop something other than the expression of juggling itself. A 3-ball tossing cascade, for example, could be considered both functional and nonfunctional, depending on the context of its application. If the intention of its interaction is nothing more than to cultivate the expression of its own experiences, we would not consider it to be functional. However, if its intention was to serve as a source of rehabilitation for some preexisting condition, like Parkinson's disease, for example, this application would be functional.

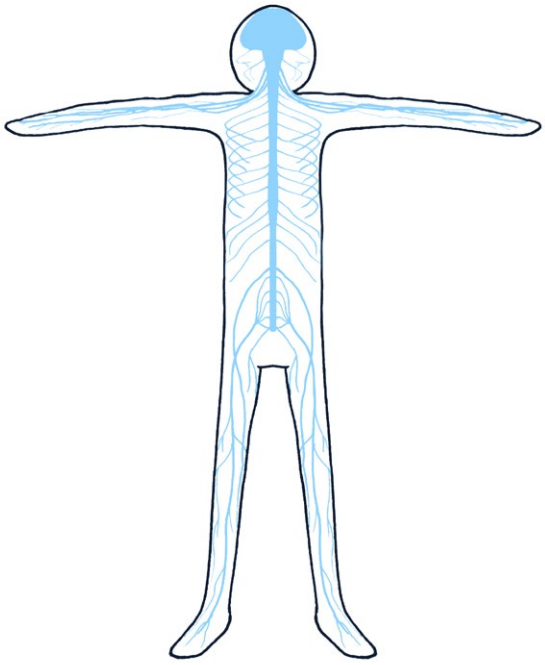
The modified and adaptive representations of *Functional Juggling* most commonly associated with its facilitation do not, in fact, hold any real relevance to the meaning of its terminology. This is because *Functional Juggling* represents a philosophy of ideas about juggling, which are not determined by the specific outcomes of its physical expression alone. It is not correct to think of *Functional Juggling* as being something other than juggling, because *Functional Juggling* is juggling, only with slightly different expectations for its outcomes. Although some apparatus are specifically designed to be inclusive, it cannot be said that any activity which embodies the experience of juggling is anything other than that, which also makes it juggling.

By describing our activity in this way, as a formula of its relationships, *Functional Juggling* allows for the transformation of its expression, while still preserving the qualitative outcome of its personalised experience. This freedom of transformation is something about juggling which, to the contrary of popular belief, determines it to be one of the most accessible activities anyone could ever try to do in their life. It means that for whatever motion a person is able to produce, there is always going to be a way to correspond that motion to the sequencing of a relationship with space and time, and thus juggling can be created by anyone.

CHAPTER 8
BINARY FORMS

Assuming our perspective is that of the human condition, there are several preliminary characterizations that can be made about our experience with space and time.

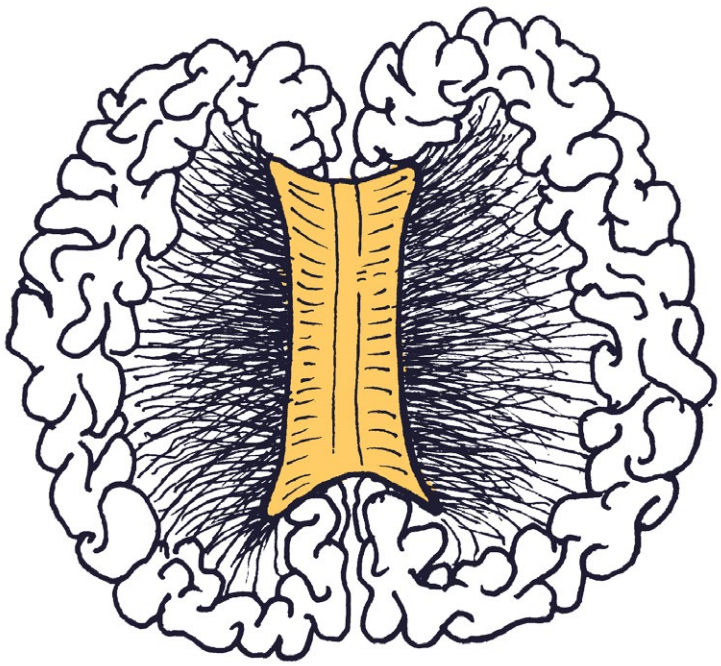
For starters, the human body and brain are binary, meaning that they consist of two halves: a **left side** and a **right side**. Each side is symmetric and mirrors that of the other, with the left side of the brain controlling the right side of the body, and vice versa.



This division of binary symmetry establishes a boundary by which all possible human interactions with space and time can occur. It means that no matter what, we are only ever able to process our experiences as being either left-sided, right-sided, both-sided, or no-sided.

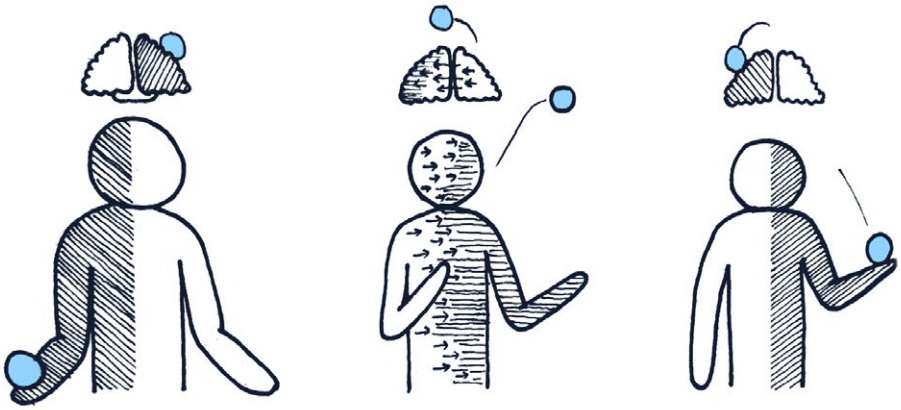
Sensory information that is received from one side of the body, will always be processed first in its correspondent side of the brain. In order to operate as a single state of consciousness, each side of the brain must be able to communicate and receive information from that of the other.

Applying this dichotomy to the anatomy of our brain requires some discussion of a specific region, known as the **corpus callosum**. This structure is responsible for communicating information, back-and-forth, between the two cerebral hemispheres of our brain. Without proper functioning of this region, each hemisphere would not be able to communicate with the other, and our ability to coordinate binary interactions with space and time would not be possible.



Whenever something is experienced by the one side of the body, like a juggling throw, for example, sensory information about its experience is communicated first to its correspondent side of the brain. Now, depending on the outcome of this throw, information about its experience will need to be communicated in either one of two directions: **laterally** or **bilaterally**.

If the intention of the throw was for it to be exchanged from one side of the body to the other, then sensory information about its experience would also need to be transferred from one side of the brain into the other.



This communication structure is referred to as being bilateral, because it relates to an exchange of cognitive information between separate sides of the brain.

Alternatively, if the throw's intention was for it to remain on the same side of the body, then less information about its experience would need to be communicated between sides. Since this communication structure relates to one side of the body more than the other, we refer to it as being lateral.

This dichotomy between the relationships of lateral and bilateral interactions with space and time establishes the most fundamental principle by which all solutions of juggling can ever be formed.

CHAPTER 9

THEORY OF PROCESS FORMATIONS (COMPONENTS)

The theory of process formations is a matrix based equation that combines and formulates the total possible sequencing outcomes of our binary interactions with space and time. This concept relates to juggling because when applied to its formula of anti-entropic sequencing, there are only a limited number of ways to structure the outcomes of its conditional values.

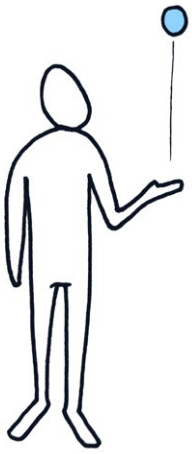
Confined within the parameters of our bilateral four dimensional experience, there are only three universal conditions by which all interactions with reality must conform: space, time, and signal. Each factor includes its own set of binary outcomes, which are formulated together to construct the sequencing relationships of the theory of process formations.

Space	Time	Signal
Lateral	Synchronous	Associated
Bilateral	Asynchronous	Disassociated

SPACE

Our sequencing relationship with spatial information can be classified as being either **lateral** or **bilateral**.

A lateral sequencing relationship with space means that its information is not required to be communicated between the two cerebral hemispheres of our brain. This occurs whenever there is an interaction on one side of the body that does not affect the experience of the other. For example, the tossing and catching of a ball, to and from the same hand.

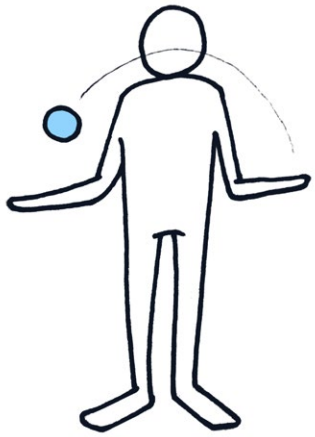


Alternatively, bilateral sequencing relationships with space do require that their information be communicated between the hemispheres of our brain. Bilateral interactions are produced whenever information from one side of the body directly affects the experience of the other.

There are several ways to trigger and subcategories these types of interactions, based on the structure of their relationship with space. This includes sequencing factors that relate to the exchange of objects, locations, and geometries.

OBJECT EXCHANGE

Exchanging an object from one side of the body to the other means that information about its experience must also be communicated, bilaterally, from one side of the brain into the other. Take, for example, the tossing and catching of a ball back-and-forth between two hands.



In this situation, the outcome of the toss directly affects the future experience of the other side, and thus information about its experience must be sequenced bilaterally as well.

LOCATION EXCHANGE

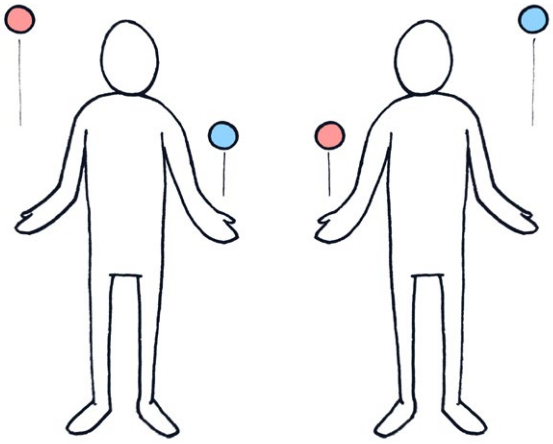
Sensory processing of spatial information is divided along the same lines as our binary experience. Meaning that, in addition to the division of our physical form, we also process space itself as being either left-sided or right-sided, relative to our position within it.

Any time one side of the body wants to interact with space on its opposite side, information about its experience needs to be communicated bilaterally as well. A very simple example of this would be the crossing of an arm from one side of the body to the other.

GEOMETRIC EXCHANGE

The bilateral geometric exchange of spatial information is slightly stranger to explain than other sequencing relationships. This is because it does not pertain to any real transference of material between space itself, but rather the comparison of its geometry over time.

Geometric exchanges of spatial information occur whenever we interact with a sequence of asymmetrically reflective conditions. Meaning that when the geometry of our interactions are asymmetrically reflective (over time), comparative information about their experiences will need to be communicated bilaterally as well.



COMBINED EXCHANGE

Any relationship with space can be sequenced individually, or combined together, in order to form a more complex state of its interaction.

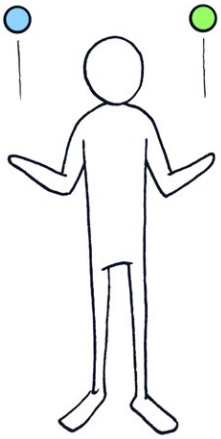
Two or more conditions of any bilateral values, such as the exchange of locations and objects, can be combined to form new levels of sequencing challenge. For example the tossing and catching of a ball between two hands, while the arms are crossed on opposite sides of the body.

The more bilateral sequencing that occurs, within a limited period of time, the more demanding its experience becomes. The most complex sequencing relationship that we can form with spatial information is one that includes all three states of its bilateral sequencing conditions. For example the classical pattern known as "Mills Mess," which combines the bilateral sequencing of objects, locations, and geometries, all within the same activity.

TIME

Our sequencing relationship with time can be classified as being either **synchronous** or **asynchronous**.

A synchronous relationship with time means that its frequency of interaction is mirrored or shared between the two sides of our brain. This occurs whenever interactions are initiated from both sides, simultaneously, such as the lateral tossing and catching of two balls at the same time.



For every binary interaction with space, the brain must be able to sequence a relationship between the timing of its own two sides. Synchronous relationships with time consolidate the frequency of their interaction, so less information about their experiences needs to be communicated as often.

An asynchronous relationship with time means that its frequency of interaction must always alternate, back-and-forth, between the two cerebral hemispheres of our brain. An example of this would be the same lateral tossing and catching of two balls, but at different times.

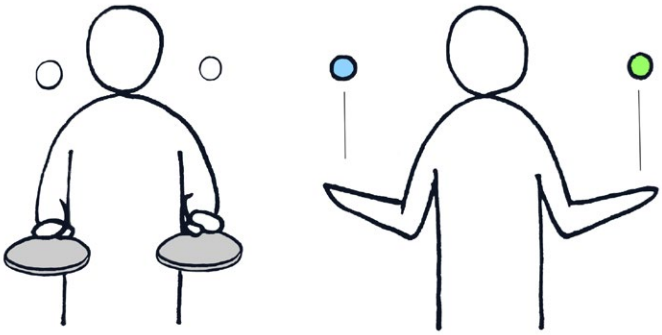
Asynchronous relationships with time do not consolidate the frequency of their interactions, and therefore, require more bilateral sequencing tasks to occur.

SIGNAL

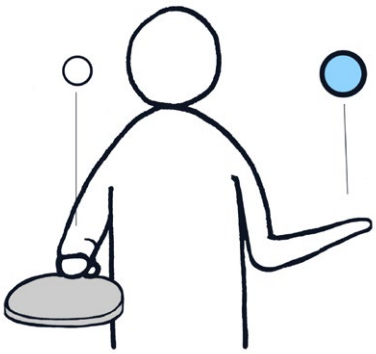
Our sequencing relationship with signal can be classified as being either **associated** or **dis-associated**. It is important to note that the sequencing conditions of signal do not affect the structural outcomes of their interactions with space and time.

Signal can be thought of as the technical means by which we choose to manage the interaction of our experience with juggling. For every movement we are able to produce with the body, there is a correspondent signal inside of our brain, which relates to the performance of its interaction.

Associated relationships with signals occur whenever both sides of the body express identical relationships to space. An example of this would be the tossing of a ball between two hands, while using an identical technique to manage the expression of both sides.



Disassociated relationships with signals occur whenever one side of the body experiences a different interaction with space than the other. An example of this would be the similar tossing of a ball back-and-forth between two hands, but with the use of a different motor control function on either side.



In this situation, the sequencing signals are not always the same, and thus they have a potential to interfere with the other one's communication. This makes processing disassociated formations extremely more complex and difficult to manage, than those of associated.

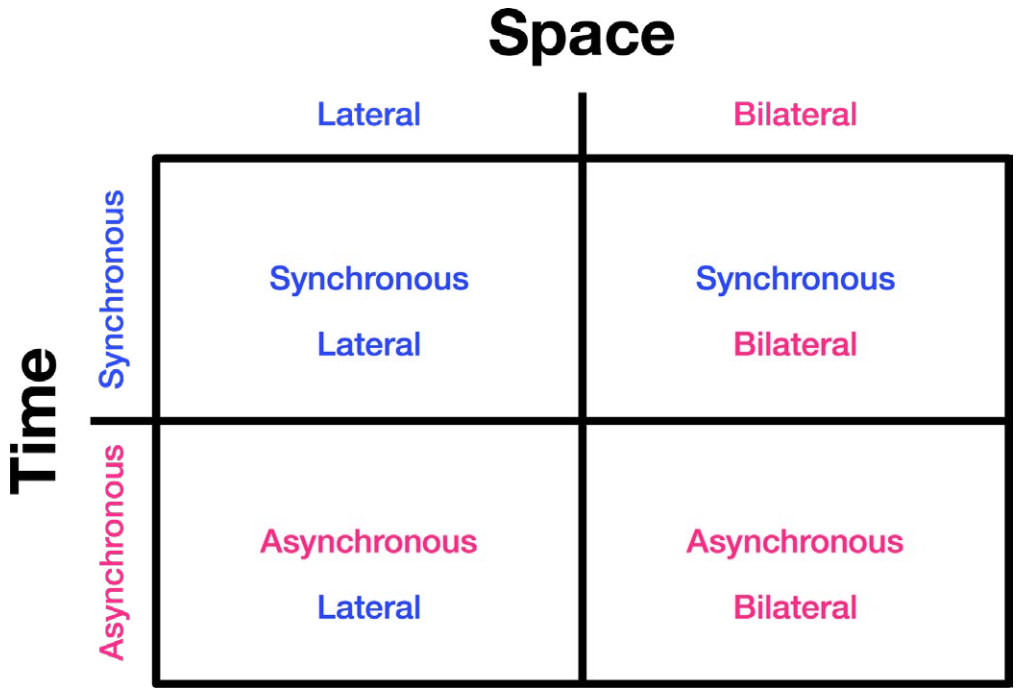
CHAPTER 10

THEORY OF PROCESS FORMATIONS (ASSEMBLY)

When formulating the equations of the process formations, it is important to separate the categories of associated from disassociated.

Associated formations are easier to sequence than disassociated, but neither affect the structural outcomes of their interactions with space and time.

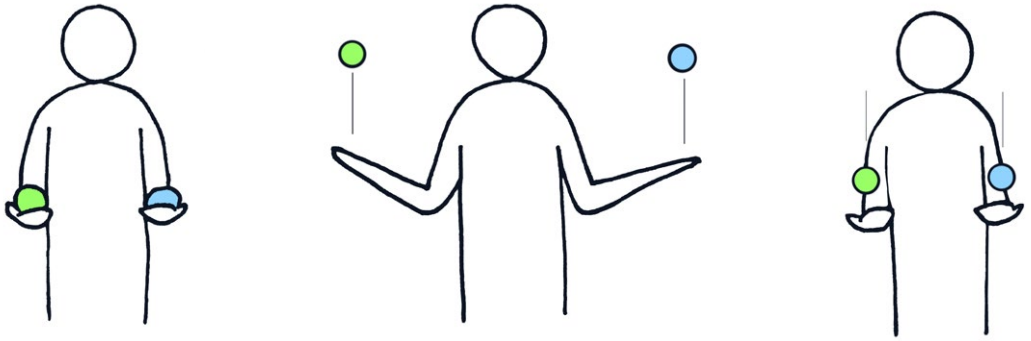
Here we see, for the first time, our principle matrix of the theory of process formations, which excludes the condition of signal as a way to simplify its equation. The matrix itself is very simple to understand, with the x-axis representing its possible outcomes for space, and the y-axis representing its possible outcomes for time.



Formulating the combined values of these conditions produces a result of four possible outcomes: *Synchronous Lateral*, *Asynchronous Lateral*, *Synchronous Bilateral, and Asynchronous Bilateral*.

SYNCHRONOUS LATERAL

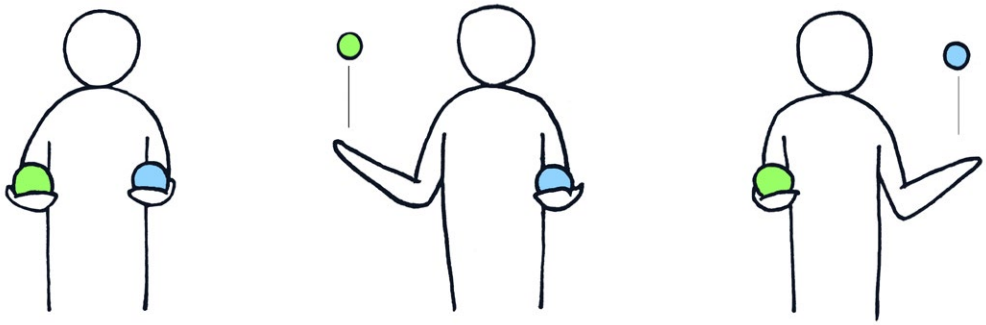
Synchronous Lateral Formations require that the timing of their interactions be the same, and that their relationship to space be divided. An example of this would be the tossing and catching of two balls simultaneously, straight up-and-down, from both sides.



In this situation, each sequencing value shares a similar relationship to that of all others, and thus its communication can be consolidated into a single frequency of information.

ASYNCHRONOUS LATERAL

Asynchronous Lateral Formations require that the timing of their interactions be different, and that their relationship to space be divided. An example of this would be the tossing and catching of two balls straight up-and-down, one after the other, in alternating rhythm.



Changing the value of time from synchronous to asynchronous, means quadrupling the total amount of bilateral communication signals needed to process its condition. This is because for every interaction on one side of the body an additional sequence of bilateral communication is needed, so that both sides can be aware of changes to their position in space, over time.

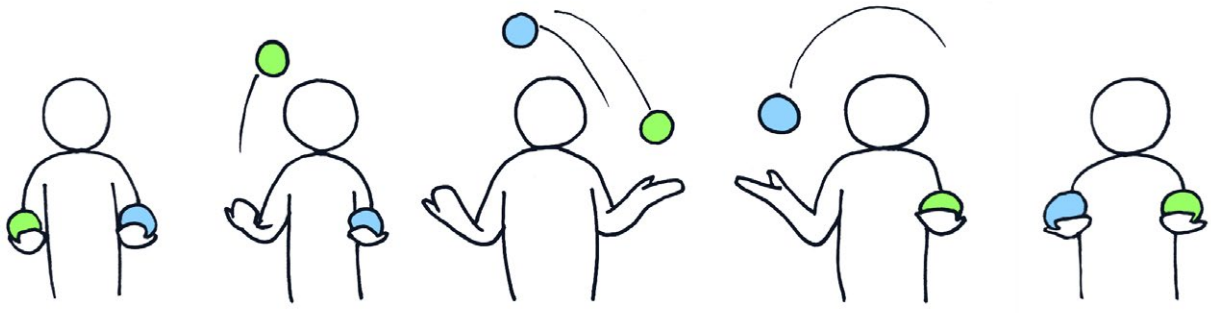
SYNCHRONOUS BILATERAL

Synchronous Bilateral Formations require that the timing of their interactions be the same, and that their relationship to space be shared. An example of this would be the simultaneous tossing and catching of two balls, between hands, from opposite sides.

In this situation we can say, again, that the relationship with time is simplified because of its synchronised tempo; however, the complexity of its bilateral relationship to space represents an overall higher level of sequencing challenge.

ASYNCHRONOUS BILATERAL

Asynchronous Bilateral Formations require that the timing of their interactions be different, and that their relationship to space be shared. An example of this would be the tossing and catching of two balls, one after the other, in between sides.



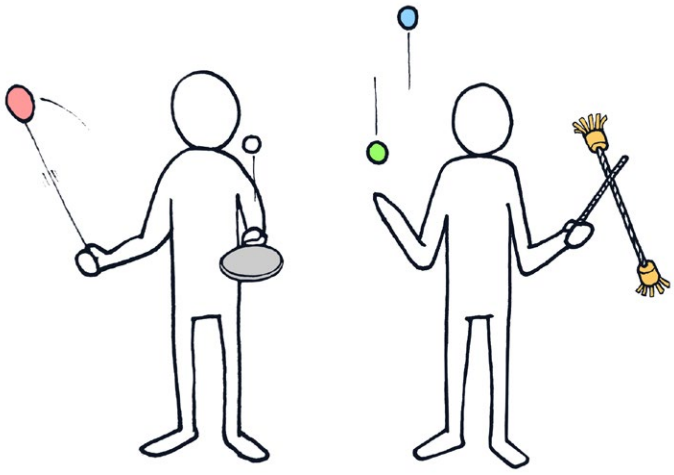
In this situation the transference of information that relates to the conditions of both time and space, must be sequenced bilaterally. This particular example, of Asynchronous Bilateral Formation, is also recognized as being the 2-ball variation of the 3-ball tossing cascade, which is traditionally thought to be one of the first activities that any student of juggling should be able to learn.

Considering how Asynchronous Bilateral interactions require the highest level of sequencing capacity, out of any other associated formation, it is curious as to why it would ever become the standardised start point of any teaching model.

DISASSOCIATED

As mentioned earlier, the binary outcomes of signal do not affect the sequencing of their relationship to space and time.

Disassociated formations are identical to those of associated formations, with the only difference being in the asymmetry of their signals. Any equation of associated formation can also be sequenced as disassociated, simply by using more than one type of motor control technique to manage the outcomes of both sides.



In this situation, each signal represents a different frequency of information which cannot be consolidated or processed simultaneously.

LISTED FORMATIONS

Now that we have established the conditions of space, time, and signal, as the primary ingredients of juggling, and have identified all of the possible outcomes of their binary solutions, we are ready to construct our final model of the theory of process formations.

Space	Time	Signal
Lateral	Synchronous	Associated
Lateral	Asynchronous	Associated
Bilateral	Synchronous	Associated
Bilateral	Asynchronous	Associated
Lateral	Asynchronous	Disassociated
Lateral	Synchronous	Disassociated
Bilateral	Asynchronous	Disassociated
Bilateral	Synchronous	Disassociated

CHAPTER 11
ARRANGEMENTS

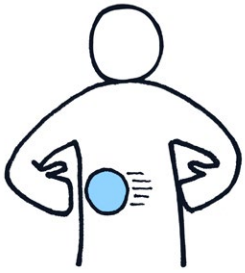
With the theory of process formations firmly in place, we are now ready to construct the physical means by which we will learn to manage the outcomes of its experiences. To do this requires careful consideration of all the possible ways that our binary forms are able to interact with orbital events in space and time.

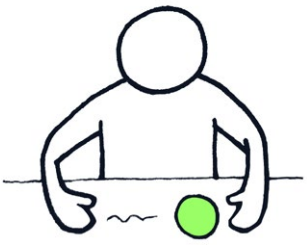
In order to be orbital, each event must be able to travel back-and-forth between at least two points in space. Under the principle that juggling is intended to be "managed," at least one of these points must be connected to the interactions of a juggler. Based on this outcome, we can deduce that there are only three ways to structure the **arrangements** of our interactions with orbital events: solo, social, and mixed.

SOLO ARRANGEMENTS

Solo arrangements structure their interactions within a closed system of experience. Meaning that their events are managed, and thereby experienced, exclusively by one person. Since the activity is managed independently, all of its sensory information is both produced and processed by the same individual. The tossing of a ball back-and-forth, between two hands, is a good example of this type of interaction.

Another equal representation would be to roll the same ball back-and-forth across the surface of a table.



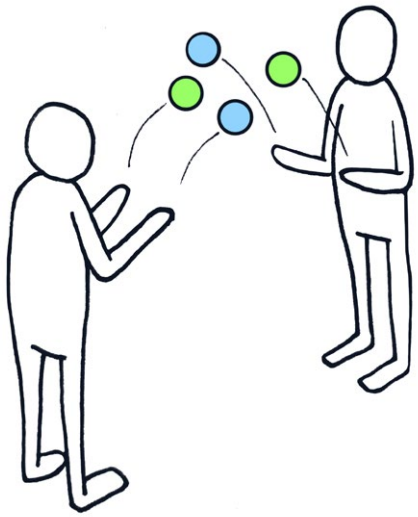


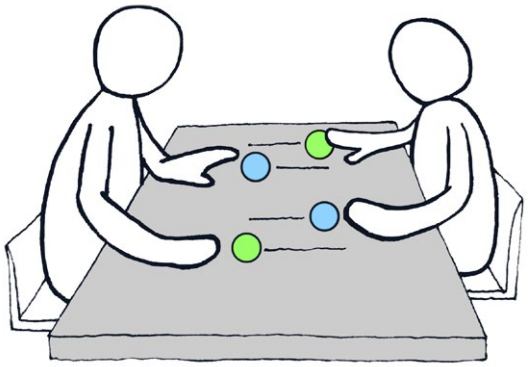
Notice how changing the outcome of the orbit does not affect the value of its relationship to space and time, only the means of its interaction.

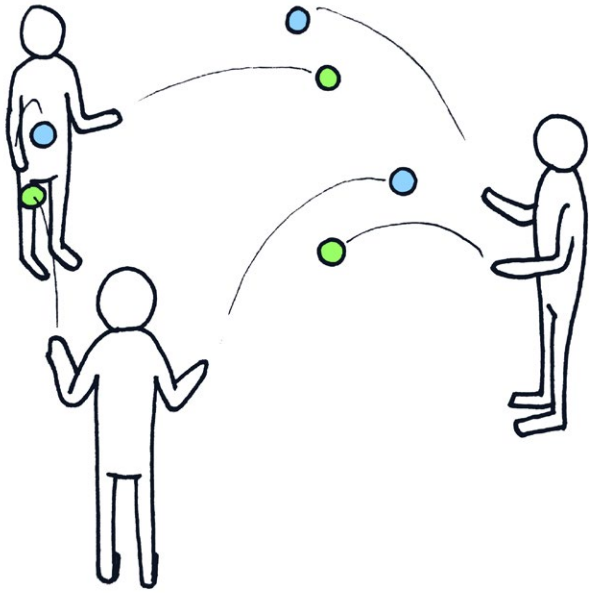
SOCIAL ARRANGEMENTS

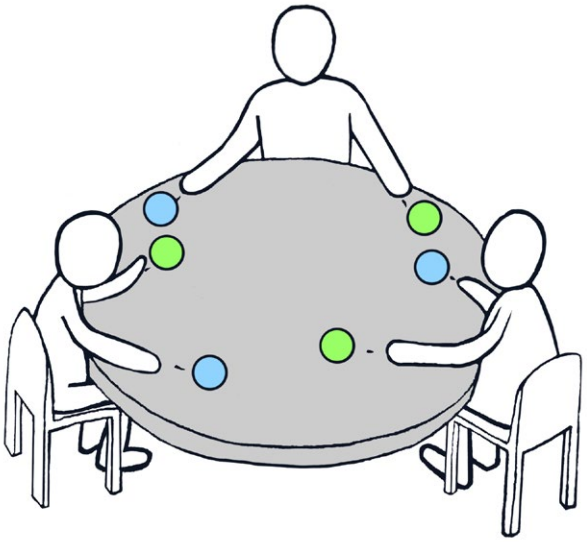
Social Arrangements structure their interactions within shared systems of experience. Meaning that their interactions with orbital events are experienced collectively by two or more people.

This could include examples such as passing any amount of objects back-and-forth between any number of jugglers. It does not matter what action is used to exchange these objects, it only matters that their relationship to us is orbital.





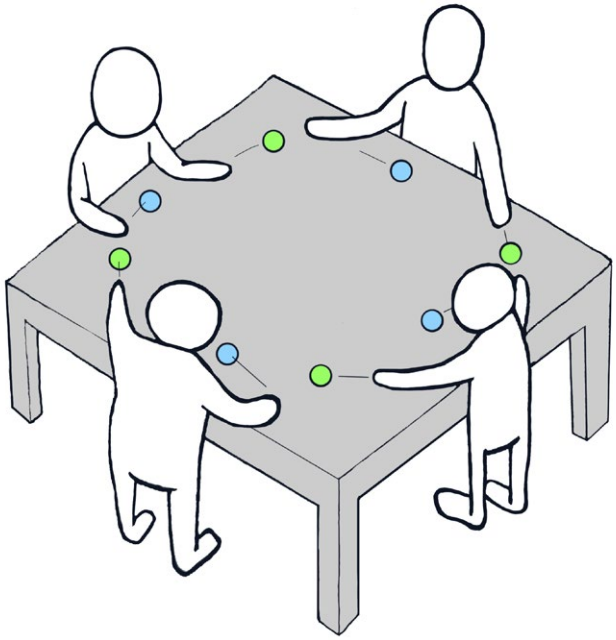




Commonly, we refer to this type of arrangement as "pass juggling", and typically it is not something that we introduce until after developing a higher level capacity for individualised activities. This makes a lot of sense, because having to be aware of both someone else and ourselves, at the same time, is obviously more challenging than just having to be aware of ourselves. However, if managed appropriately, social arrangements can be a very effective means for facilitating juggling.

MIXED ARRANGEMENTS

Mixed Arrangements structure their interactions within a combined system of experiences. Meaning that some of their interactions are managed individually, while others are managed in cooperation. Basically, it forms a combination between the two styles of solo and social arrangements.

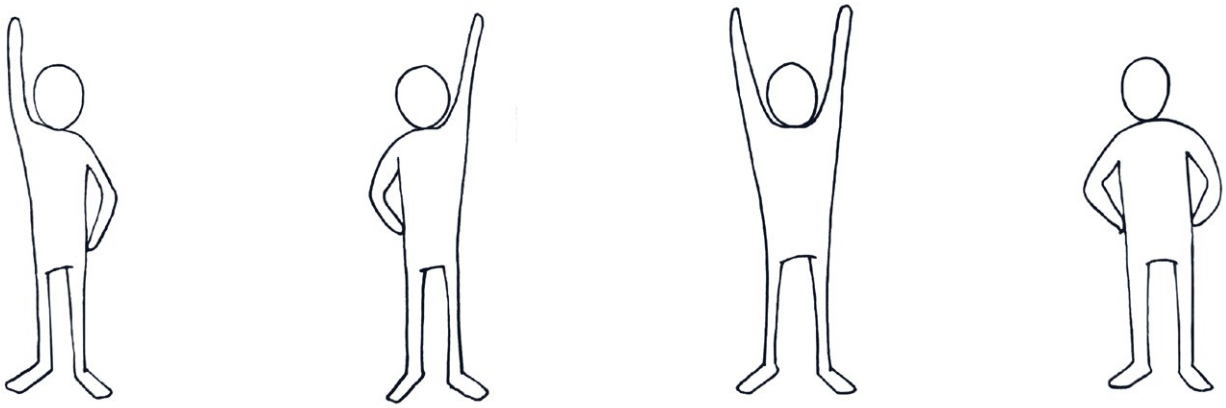


A classic example of this would be something known as a "4-Beat" passing pattern between two jugglers.

In this situation, the jugglers exchange only one object with each other, for every three objects they exchange with themselves. Something that is challenging, and yet also helpful, about this type of arrangement is that it requires us to divide our attention between different points of incoming information. Although this requires higher capacity in the context of traditional toss juggling, if we are willing to modify the mechanics of its activity, then utilising this type of arrangement can be a supportive means for facilitation juggling activity as well.

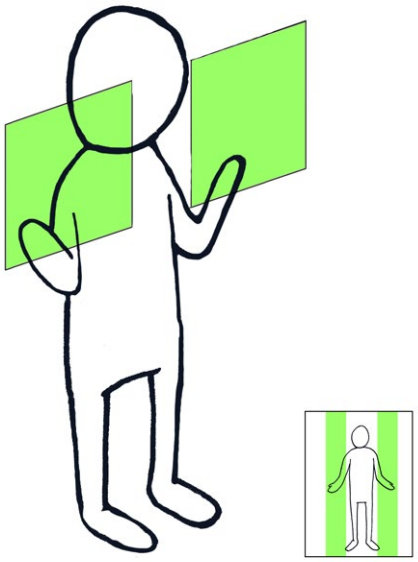
CHAPTER 12
SPATIAL SEQUENCING MAPS

By reflecting on the interactions of our binary form, we can establish that any sequenced condition of space, time, or signal will always be processed as being either left-sided, right-sided, both-sided, or no-sided.

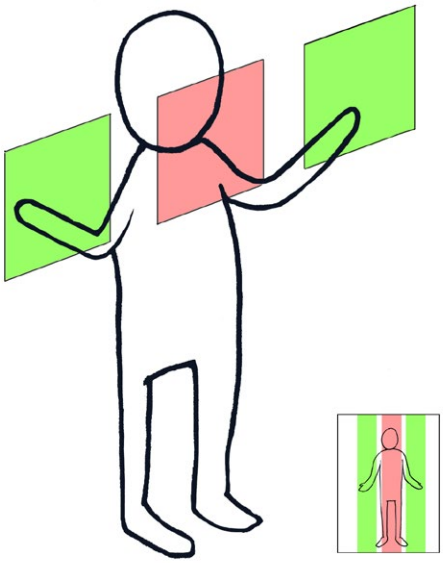


Applying this condition to the structure of our relationship with orbital events, allows us to construct what we call a **spatial sequencing map** of our interactions. This includes determining the minimum amount of spatial reference points which are needed to sequence the entire spectrum of our binary relationships with space and time.

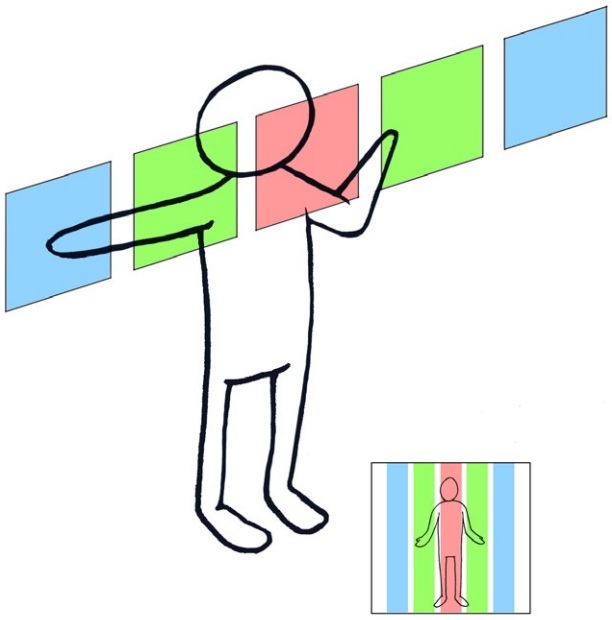
In order to stimulate these desired conditions, we must be able to interact with at least two-points of spatial information: one from each side of the body.



In addition to two bilateral points of interaction, another centralised point of information is needed to be able to mark the midline separation between the two sides of our binary experiences.

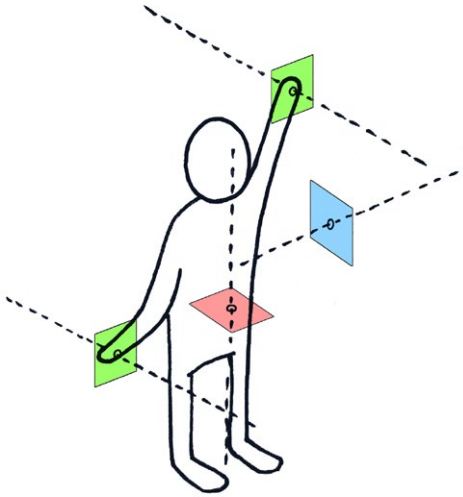


Combinations of these initial three points are enough to sequence most interactions with juggling; however, they do not provide enough opportunity, on their own, to formulate the entire spectrum of our possible relationships with space and time. To achieve this condition, an additional two points of interaction must be added: one to either side of the body.

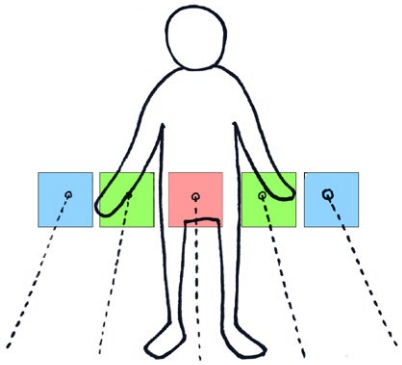


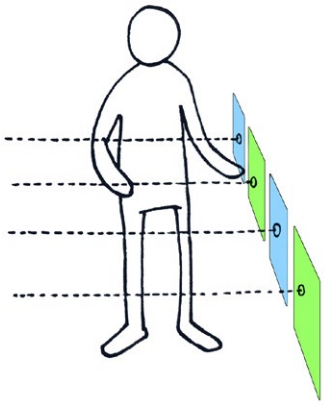
This creates a total of five sequencing points, with one positioned directly in the centre, and two more positioned on either side of the midline.

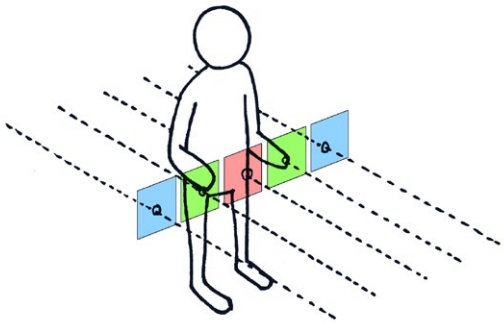
Most commonly, for facilitation, these points are arranged in a horizontal plane, in order to make their interaction more accessible. However, it is equally imaginable to arrange them in any order of height (y), depth (z), or width (x).

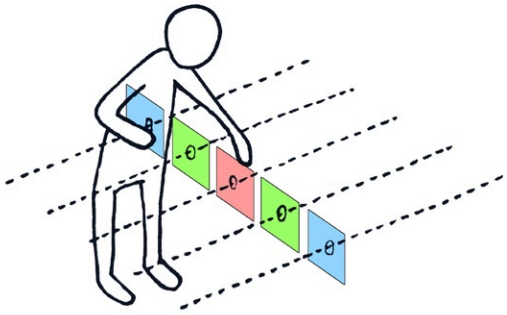


Although it is possible, and encouraged, to produce many different arrangements of these sequencing points, it still remains good practice to introduce new sequencing experiences along no more than one axis of interaction at a time.









Spatial sequencing maps are intended to indicate where and when our interactions will occur, but do not determine anything about the manner in which they should be expressed.

The Juggle Board is one way to represent the concepts of a five point spatial sequencing map; however, it is not the only way we have to manifest such environments. Although we will be working exclusively with this device to model and develop our introductory understanding of Functional Juggling, it is important to note that the concepts themselves are not exclusive to the apparatus, but rather intended to be transferable.

CHAPTER 13
PROP SWAP NOTATION

Propswap is an ordered system of notation that allows us to describe the different sequencing activities of *Functional Juggling*. It derives its grammatical influence from the classical model of siteswap notation, which is the mathematical language of juggling. Knowledge of siteswap is not required in order to understand propswap, however, it can be helpful to grasp the basic concepts of both systems. In general, siteswap seeks to calculate the order of its events in time, whereas propswap acts to identify the location of events in space. Propswap is intended to create another universal language of juggling that can be shared and described, without any additional need for its translation.

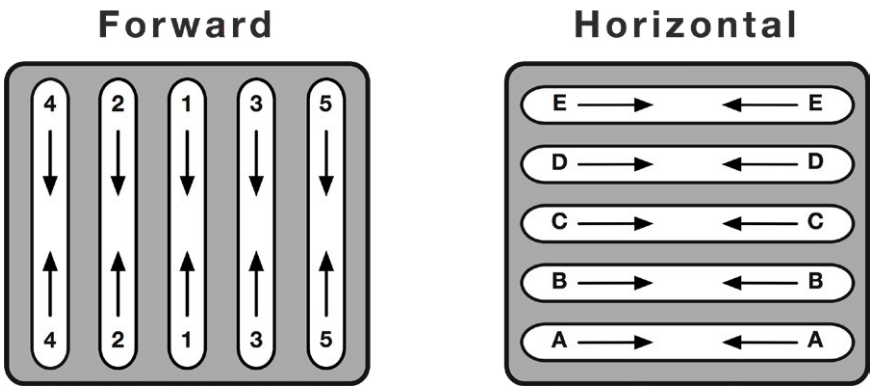
There are, literally, limitless ways to construct the environments of *Functional Juggling*; however, for the purpose of its explanation we will be focusing our investigation around the use of one prop in particular: the *Juggle Board*. Possession of a *Juggle Board* is not required to be able to learn how to apply the sequencing relationships of propswap notation, however, it is strongly recommended that you either produce or acquire an equivalent means of its interaction. Juggle Boards can be purchased from independent sellers, or manufactured personally in a variety of ways from repurposed materials and the use of open source design documents. More information about both these options can be found online at www.QuatProps.net.

INTEGER VALUES

Our system of notation begins with the assigning of integers to each of the locations, within one of our five point spatial sequencing maps. Notation is written in the form of either numbers or letters, depending on the orientation of its interaction.

ARRANGEMENTS

As described earlier, there are three possible ways to structure our interactions with orbital events: solo, social, and mixed. Each arrangement can be categorised and labeled based on the orientation of its interaction, which is said to be either **forward** or **horizontal**. For forward orientation a series of numbers (1-5) is used to notate each location within its spatial sequencing map, and for horizontal orientation a system of letters (A-E) is applied instead. This allows each orientation to be easily recognisable, from that of the other, while still sharing the same system of notation.



As illustrated here, **forward arrangements** can be said to organise themselves perpendicular to our x axis, whereas **horizontal arrangements** are organised parallel to it instead. Both arrangements can be engaged either individually or socially, but in general, horizontal arrangements are used more to facilitate solo interactions, whereas forward arrangements are more accommodating for social. The spatial sequencing map of a forward arrangement activity is numbered 1-to-5, with the first of its integers being located at the centre, and each of its proceeding values alternating sides from that point forward.

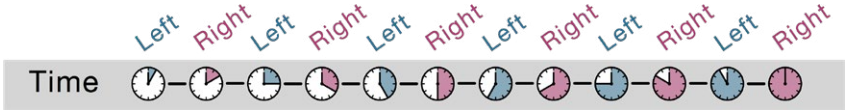
4	2	1	3	5

For horizontal arrangements, locations are identified by the use of letters A through E instead. Each letter is arranged in ascending order from bottom-to-top, starting with A at the bottom, and ending with E at the top. Horizontal arrangements, unlike that of forward, represent two possible points of interactions: one for each side of the body.

Left Side	**E** **D** **C** **B** **A**	**Right Side**

TIME

Reading notation follows the same principle as reading a timeline, because the order in which its integers appear, is the same order in which they occur in time. Each integer, within its series of notation, represents a different beat in time, and every beat assumes to alternate from one side of the body to the other.



We refer to this kind of relationship as being **asynchronous** and it is the default structure of all notation.

EMPTY BEATS

There is one other integer that applies to the notation of both arrangements and that is the value of zero. Zeros are used to indicate the skipping of one beat in time, or in other words, whenever one side of the body interacts more than once before changing sides. This form of notation is more advanced and not something that is often used in general facilitations as it tends to require verbal communication to be able to explain.

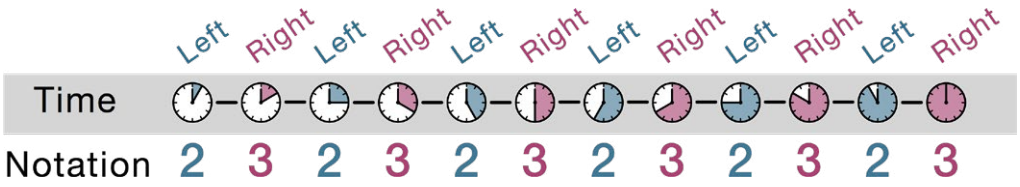
PERIODS

The **period** of notation is the amount of integers which are included in one full, non-repeating, segment of its sequence. Meaning the amount of integers before it repeats itself again. The period of a notation can sometimes be different to the cycling of its own interactions, as not all sequences are said to be symmetrically balanced in time.

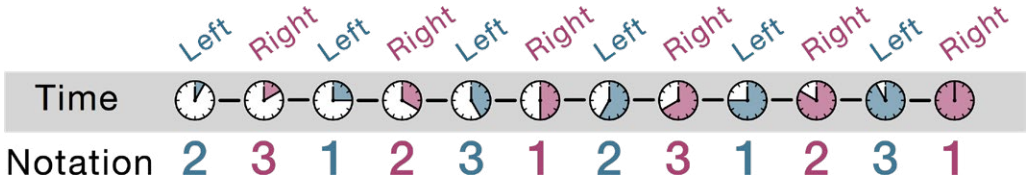
Periods have the possibility to be either even or odd, depending on how many integers they include. **Even period** notations require only one repetition of their segment in order to complete their cycle, whereas **odd period** notations require multiple.

This difference can be observed more clearly in the following examples of *23* and *231*.

Example: ***23***



Example: ***231***



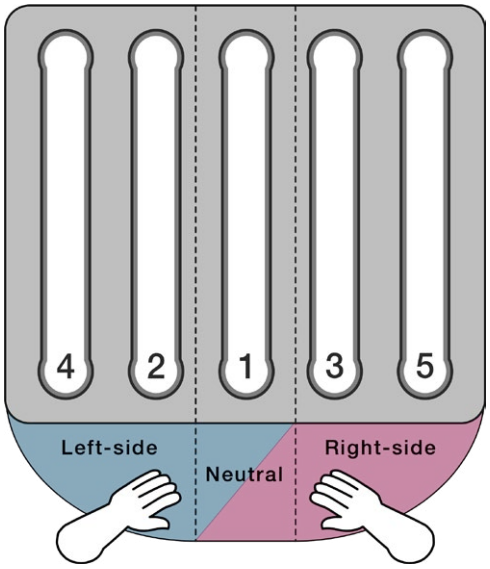
Notice here, how in the example of *23*, each integer remains fixed to one side of the body; whereas, in the example of *231*, each integer alternates from one side to the other. This means that odd period activities will always require bilateral sequencing as a natural part of their interaction; whereas even periods are assumed to be lateral, unless they are notated otherwise.

Because of this, an asterisk symbol is sometimes used to mark the end of odd period notations, just as a way to draw attention to the hidden complexities of their interaction. For example the notation of *231*, might also appear as *231** in certain training settings. Unlike the use of other symbols, this indication does not change anything about the notation itself, but does remind us about its advanced level of challenge.

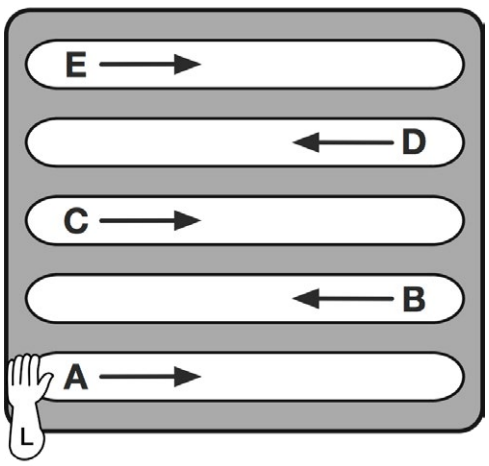
START POSITIONS

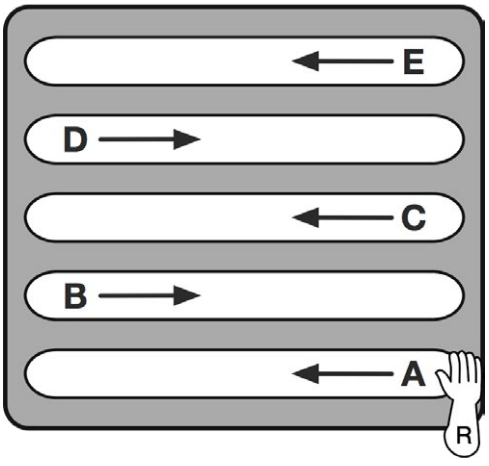
The side of the body that initiates notation is always assumed to be lateral, unless otherwise notated. Meaning that the side of the body which is closest to the first integer of a notation, is the same side that accepts its interaction.

Forward arrangements can be thought of as having a relationship with space that is either left-sided or right-sided, with the centre point of its interaction being neutral to both sides.



For **horizontal arrangements**, each integer represents one sequencing point for either side of the body, so we are not able to determine its start position simply by the order of its notation alone. We resolve this issue by applying the settings of asynchronous time, and lateral initiation, from the start. This allows horizontal notations to be set according to either side of the body, so long as the ordered laws of its notation are preserved.





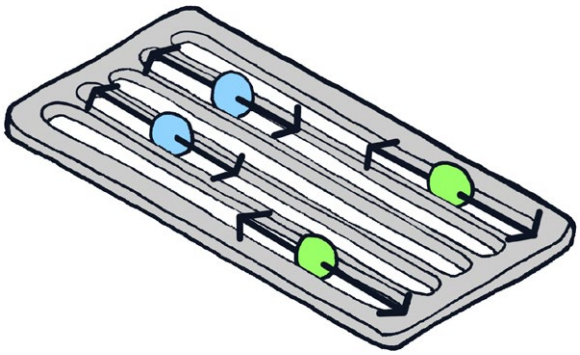
STATES OF ORBITAL INTERACTION

There are no specified ways to interact with Functional Juggling, or the environment of the Juggle Board itself, so any means of interaction is considered acceptable. Regardless of this expressive diversity, however, there are a limited number of ways in which we are able to structure the outcomes of any of our interactions with orbital events in space and time.

We categorise the order of these relationships as being either **fixed-state**, **open-state**, or **mixed-state**, based on the dimensional parameters of their interaction.

FIXED-STATE

Fixed-state interactions represent a form of relationship with orbital events in which their pathway through space is arranged directly in between two points. Meaning that their orbits are linear and follow a single path of motion, as they travel back-and-forth, in both directions. This results in an extreme simplification of their interaction, as the only thing required to manage their experience is a single point of contact with an opposing force of motion.

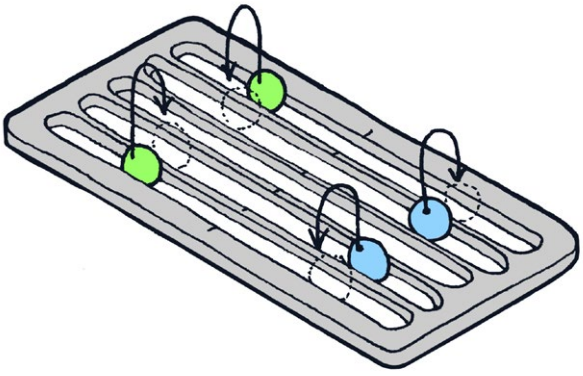


This makes management of their activity much easier to process, as each event is contained within its own region of space, and, therefore, not able to interfere with the motion or visual processing of any other.

In the context of working with the Juggle Board, we will be using very specific hand positioning to describe the management of its activities, however, do not forget that any means of accomplishing the same goal is always considered acceptable.

OPEN-STATE

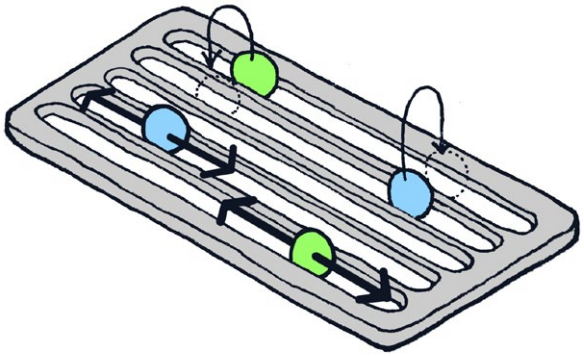
Open-state notations describe a form of relationship with orbital events in which their pathway through space includes multiple dimensions of interaction. Meaning that their orbits are non-linear and follow a progressive path of forward motion through space.



In these situations, orbits are able to complete their entire revolution without having to crossover any of their previously visited locations in space. This allows multiple events to be sequenced per each location, as the incoming pathway of orbits do not interfere with the outgoing directions of their interaction. Obviously, this increases the overall sequencing challenge of the activity, and creates additional mechanical demands such as the need to grasp and release objects from one location to another, however, as always, any means of accomplishing the same goal is still considered acceptable.

MIXED-STATE

Mixed-state notations describe a form of relationship with orbital events in which the outcomes of both fixed and open-state interactions are mixed together to form a single sequence of activity. Meaning that some points of interaction will be managed as fixed-state, while others will be managed as open.



Both forms of interaction require separate cognitive signals to be able to perform, and this is what creates our condition of disassociated formations. Although interesting and fun to explore, these types of interactions rank among some of the most challenging bilateral sequencing relationships that we are able to form. As such, it is not considered necessary for all participants to reach this level of sequencing capacity, as it extends far beyond what we generally expect from most high functioning individuals.

Additionally, it is not possible to consistently communicate the intentions of these types of activities, without the need for verbal and/or visual communication strategies. Since not everyone is equally equipped to process such information in the same way, we do not consider these types of notation to be universally accessible for everyone. Still, there is a time and place for everything, and mixed-state notations are a quick and easy way to dramatically increase the complexity of any juggling activity.

CHAPTER 13
FIXED STATE NOTATION

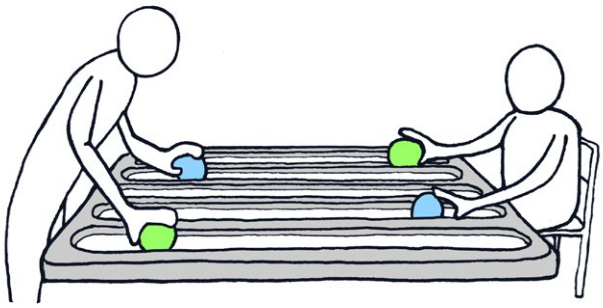
The rules to remember when applying fixed-state notations are that its interactions follow a time-line of alternating motion from side-to-side, and that its events are assumed to initiate laterally.

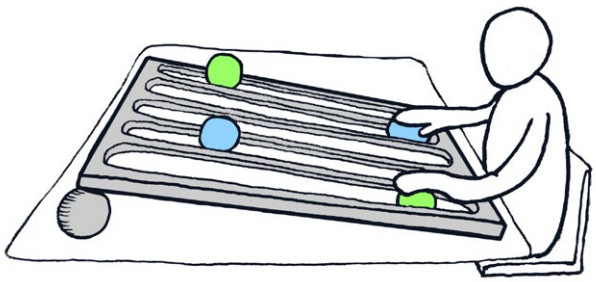
ASYNCHRONOUS LATERAL

Asynchronous lateral is the default state of any notation, which is written without the use of additional grammar. Meaning that its notation is represented by the simple series of its integers alone. Asynchronous notation is pronounced and read one digit at a time, and not as a whole value.

So, the notation *2345*, for example would be expressed as two three four five; and not as two thousand three hundred and forty-five.

Whenever an integer appears within a series of notation, it indicates that some form of interaction with its location should occur at that time. In the context of the Juggle Board, we express this kind of relationship by the rolling of balls back-and-forth, in between two points. This can be achieved by exchanging objects between two partners, or by raising one side of the Juggle Board slightly higher than the other, so that each ball is able to roll back to us on its own.

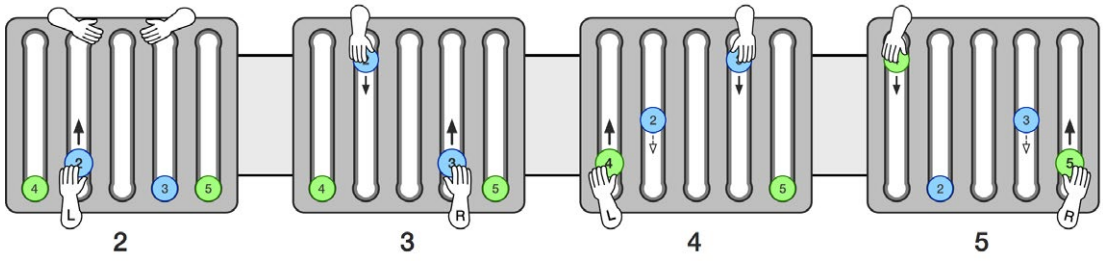




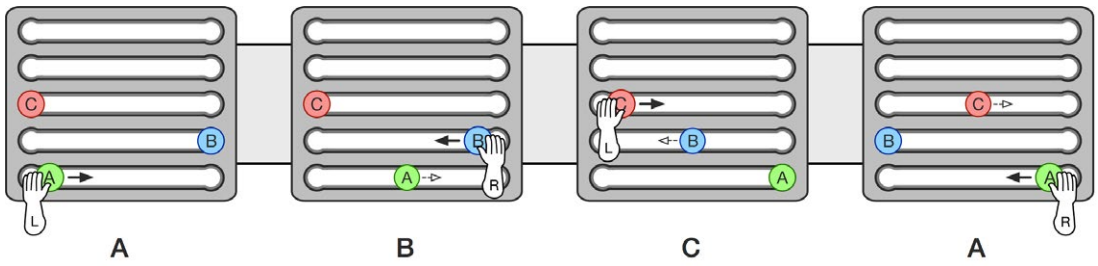
For the purpose of explaining notations, we will be using two dimensional diagrams to represent the interactions of each sequencing step. Illustrated diagrams are intended to be intuitive, and serve as an extension to the existing language of propswap notation.

EXAMPLES

Forward Asynchronous Lateral, 2345



Horizontal Asynchronous Lateral, ABC



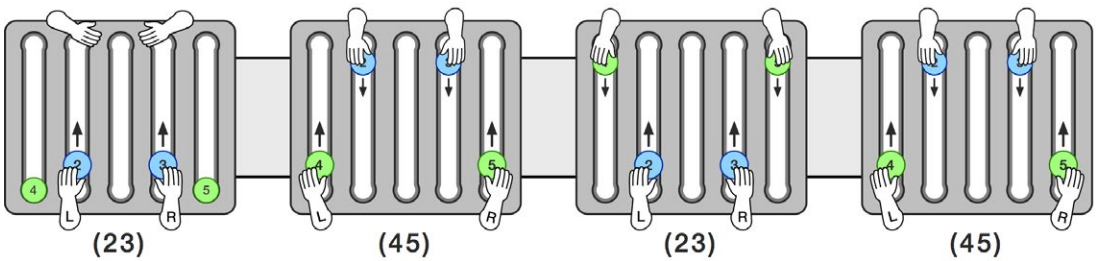
SYNCHRONOUS LATERAL NOTATION

Synchronous lateral notations describe sequences in which both sides of the body engage simultaneously, but do not exchange spatial information in between sides. To indicate this type of interaction enclosed parentheses are placed around combined sets of integers, such (*23*) or (*AB*). When placed inside parentheses, we read each value collectively, rather than individually, as in the way that we do with asynchronous notations. So, instead of reading the integers of (*23*) separately, as two and three, we express their value as being twenty-three in order to communicate their shared relationship with time.

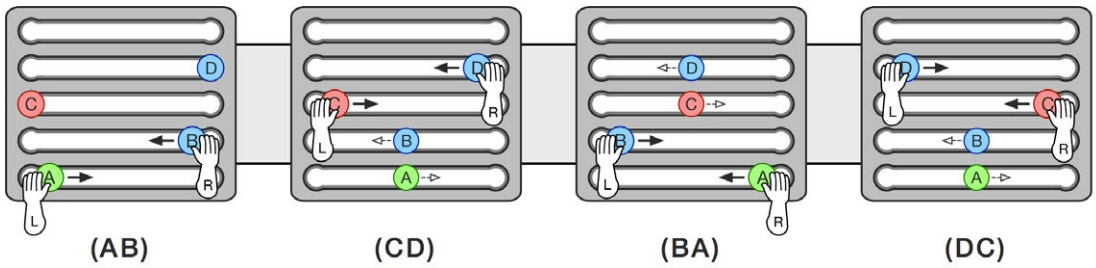
This system of combination does not apply to the reading of horizontal notations, as it is more complicated to pronounce the combined expressions of letters than it is numbers. Still, when expressing the synchronous values of horizontal notations, a brief pause should be taken in between the expressions of shared letters, just as a way to help emphasize their separations in time.

EXAMPLES

Forward Synchronous Lateral, (23)(45)



Horizontal Synchronous Lateral, (AB)(CD)



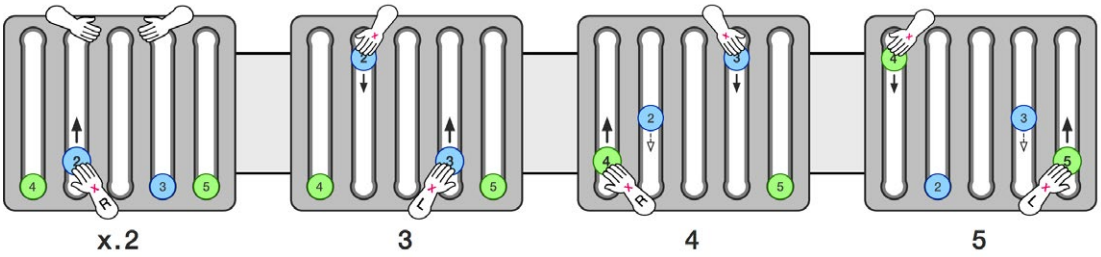
ASYNCHRONOUS BILATERAL NOTATION

Asynchronous bilateral notations describe sequences in which every beat alternates from side-to-side, and each beat crosses or exchanges its spatial information, bilaterally, from one side to the other. This type of notation is indicated by the use of an x symbol followed by a period (x.), placed prior to the start of its notation. In general the x symbol is used to instruct the changing of our relationship with space, from lateral to bilateral or vice versa.

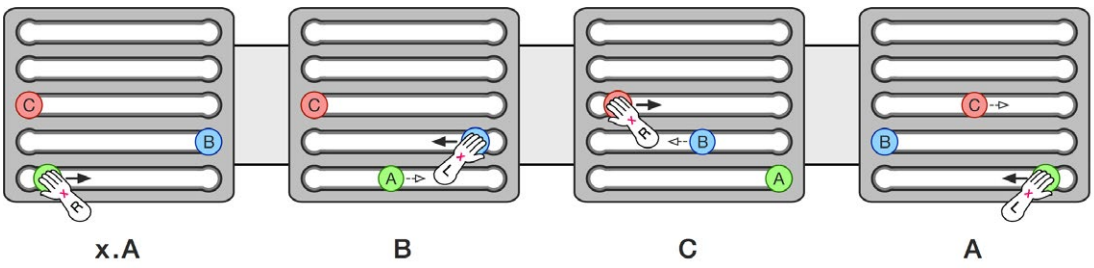
Since the presumed relationship with time is asynchronous, crossing or reversing the first integer of its interaction will cause the rest of its sequence to be inverted as well. As the periodic segment of each notation is intended to repeat, the punctuation of a period is used to indicate that x notation should only be applied once, from the start.

EXAMPLES

Forward Asynchronous Bilateral, x.2345

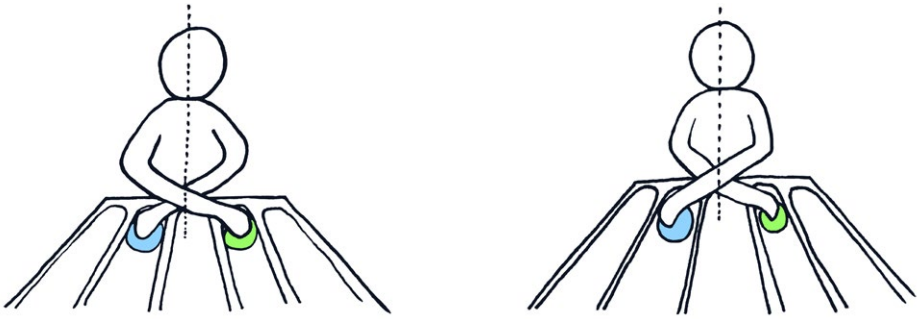


Horizontal Asynchronous Bilateral, x.ABC



SYNCHRONOUS BILATERAL NOTATION

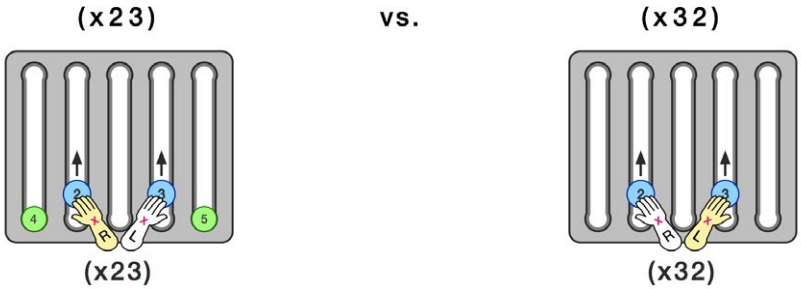
Synchronous bilateral notations describe sequences in which both sides of the body engage simultaneously, while also exchanging and sharing spatial information about their experiences between sides. This type of situation requires slightly more complex notation to be able to communicate, as there are numerous ways to structure the potential outcomes of its interactions. For example, simply indicating that a synchronous notation should be performed bilaterally, does not communicate which of its sides should be positioned, above or below, that of the other.



Synchronous bilateral notation is written with the same parenthetical enclosures as its synchronous lateral counterpart. The x symbols, which are used to indicate the crossing or uncrossing of notations, are placed inside parenthesis as well. An x at the beginning of a notation indicates that its interaction should be performed bilaterally; however, an additional x positioned at the end of the same notation, would require its interaction to change or revert back to its previous condition.

There are several ways to structure the outcomes of these types of interactions, however, for the purpose of universal facilitation there is only one form of its behaviour which can truly be said to be accessible for everyone. This has a lot more to do with the communication of its ideas, then it actually does with the complexity of its motor control movements.

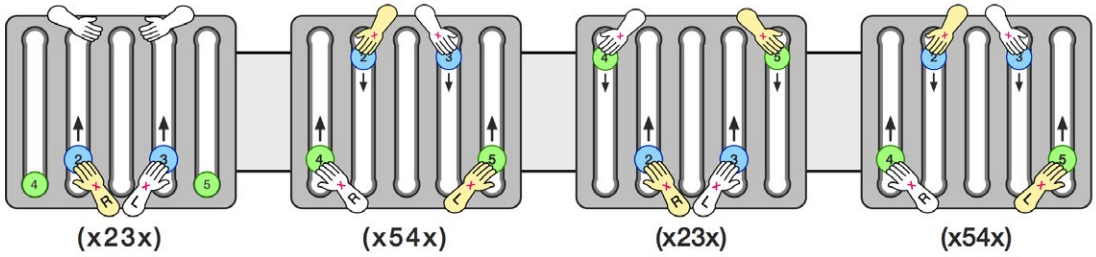
As mentioned earlier, it is important to be able to indicate which side of the body is positioned above or below that of the other. This indication is achieved by the specific ordering of integers, within their individual sets of parentheses. The general idea is that whichever integer appears first, is always assumed to be positioned above that of the other. So for example, the notation of (*x23*) indicates that the side of the body which is responsible for managing the *2*, should be positioned above that of the *3*. Whereas in the example of (*x32*), it is the *3* which is positioned above that of the *2*.



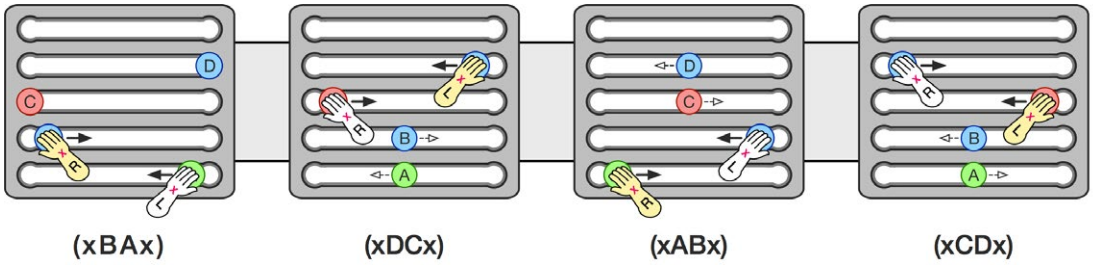
As a way to draw further attention to which side of the body is positioned above that of the other, a discrepancy of yellow colouring is used to indicate which of the sides is intended to be on top.

EXAMPLES

Forward Synchronous Bilateral, (x23x)(x54x)



Horizontal Synchronous Bilateral, (xBAx)(xDCx)

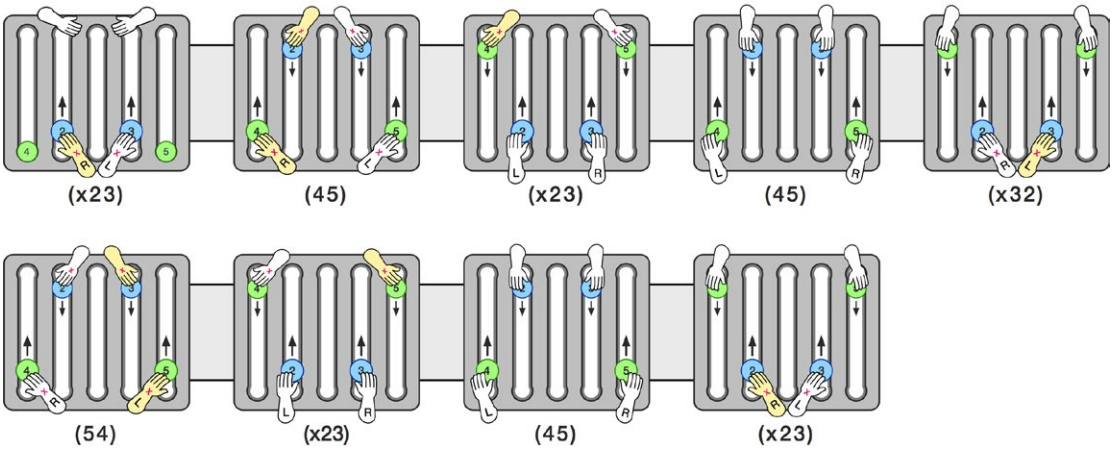


Here we see a form of synchronous bilateral notation which represents its highest level of sequencing challenge. As stated before, this type of relationship is the one most commonly used in facilitation, as it can be explained with the least amount of communication. Each x within its own series of synchronous notation indicates the individual crossing or uncrossing of our relationship with space. Meaning that whichever side of the body is positioned above that of the other, will always alternate from one beat to the next.

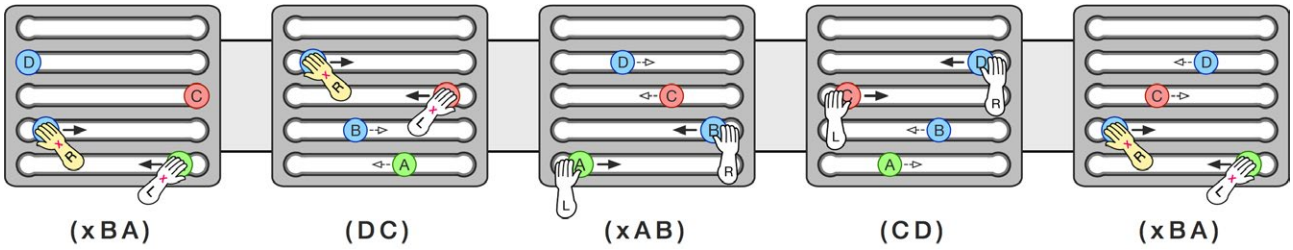
There are several other ways to order these types of interactions which are not often used in facilitation, but that we have illustrated for you below.

EXAMPLES

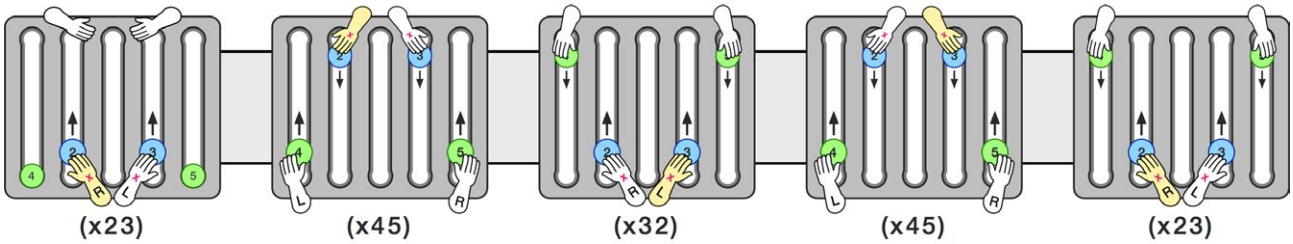
Forward Synchronous Bilateral, (x23)(45)



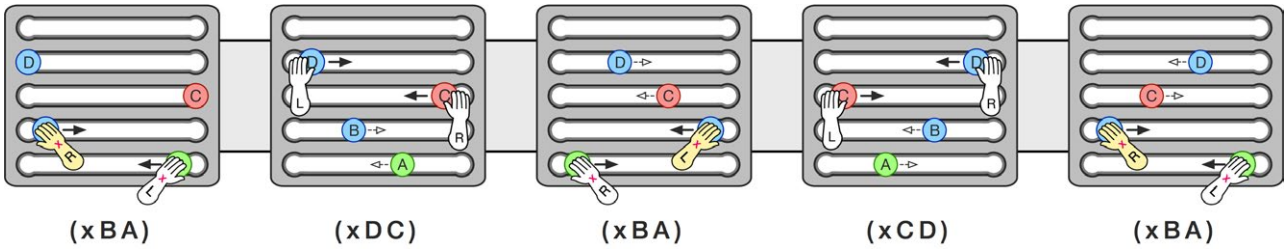
Horizontal Synchronous Bilateral, (xBA)(DC)



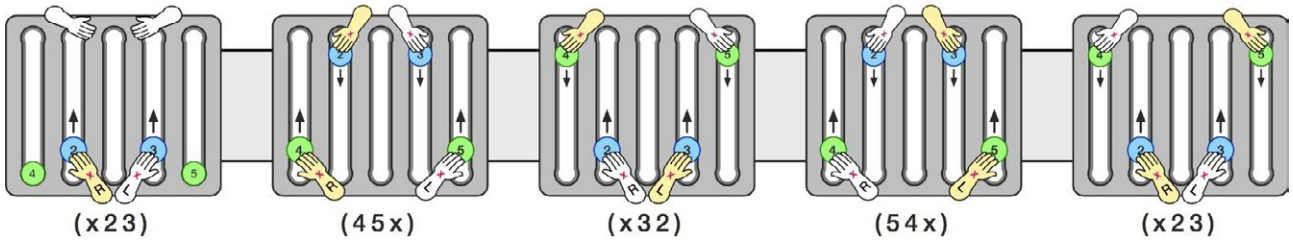
Forward Synchronous Bilateral, (x23)(x45)



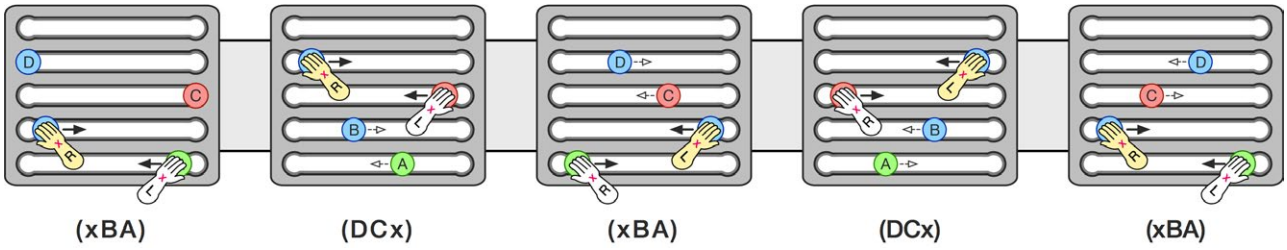
Horizontal Synchronous Bilateral, (xBA)(xDC)



Forward Synchronous Bilateral, (x23)(45x)(x32)(54x)



Horizontal Synchronous Bilateral, (xBA)(DCx)

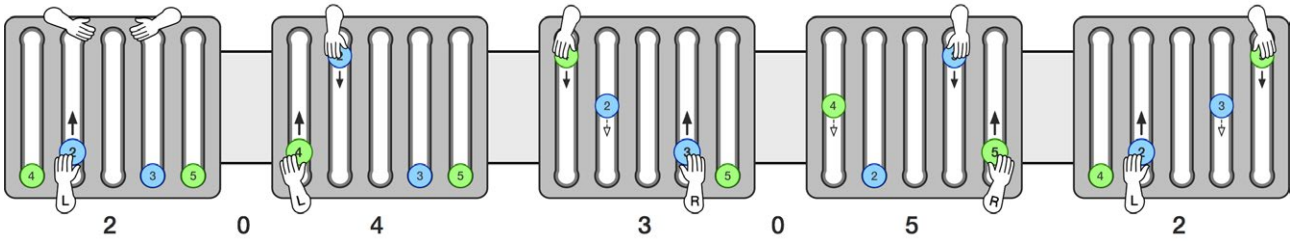


ZERO BEAT NOTATIONS

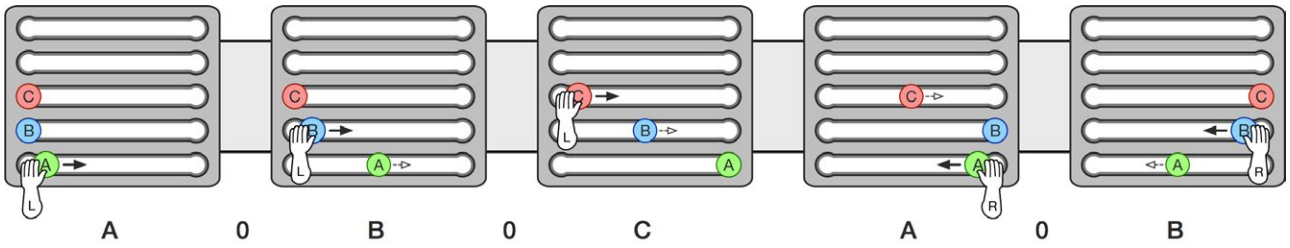
As described earlier, there is one integer value which applies to both arrangements of the *Juggle Board*. The appearance of a zero, within either system of notation, indicates that one side of the body will skip its turn, and that the other side will go twice. This form of interaction is difficult to communicate without the use of verbal instruction, as it requires us to deviate from the default relationship of asynchronous time. For this reason, you will not find this kind of activity within the primary structures of our facilitation compositions.

EXAMPLES

Forward Asynchronous Lateral, 204305



Horizontal Asynchronous Lateral, A0B0C



CHAPTER 15
OPEN STATE NOTATION

READING AND WRITING OPEN-STATE NOTATION

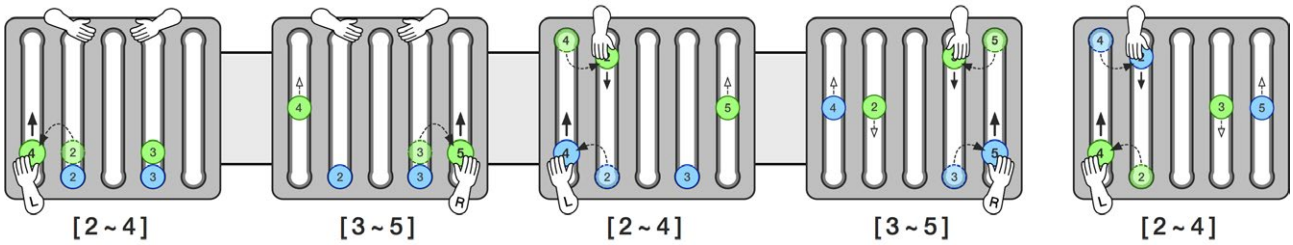
Open-state notation describes a form of interaction that starts in one location and ends in another. This means that each of its events must be notated with two integers: one to indicate where it begins, and another to show us where it ends. We notate this type of relationship by the use of brackets and a dash mark, placed in between the different values of each notation. The first integer indicates the start position of its interaction, and the second integer tells us where it should go. Thus, a notation of [*2~4*], for example, would indicate that a ball which arrives in the *2* position, should be lifted and exchanged into the position of the *4*.

Open-state interactions allow us to overlap their orbital pathways, which means that we are able to increase or decrease the total amount of objects used to facilitate each notation. A notation that is sequenced with four objects, therefore, can also be sequenced with six, eight, or any other multiple of two for that matter.

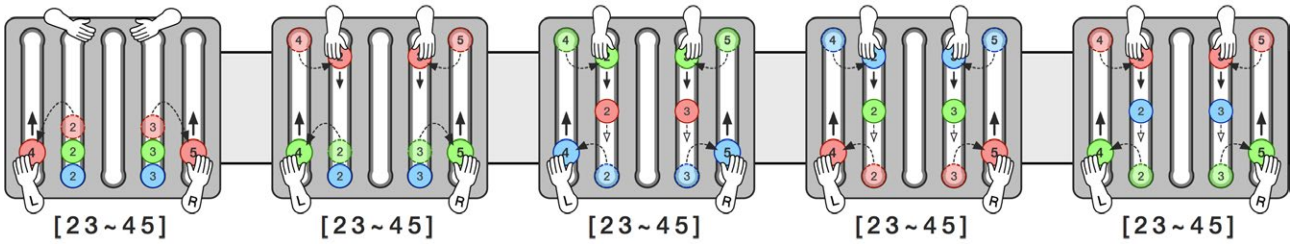
For the sake of clarity, we will be using four and three ball examples in most of our illustrations, however, in the first two examples we have included two illustrations of six and five ball variations as well.

EXAMPLES

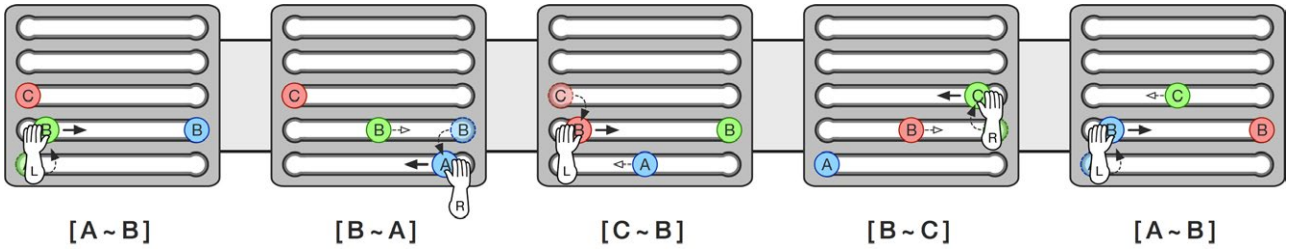
Forward Asynchronous Lateral, [2~4][3~5]
with 4-balls



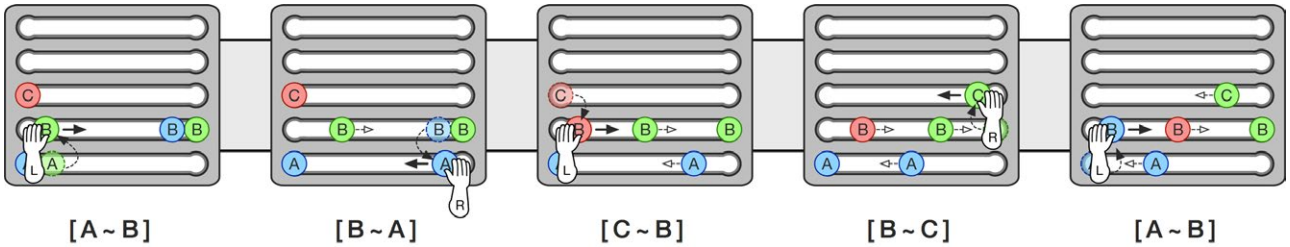
Forward Synchronous Lateral, [23~45]
with 6-balls



Horizontal Asynchronous Lateral, [A~B][B~A][C~B][B~C] *with 4-Balls*



Horizontal Asynchronous Lateral, [A~B][B~A][C~B][B~C] *with 6-Balls*



CHAPTER 16
MIXED STATE NOTATION

READING AND WRITING OPEN-STATE NOTATION

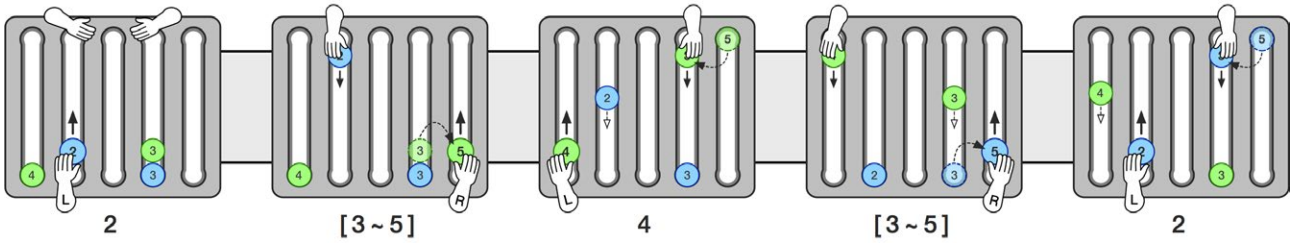
Mixed-state notation represents a form of interaction that combines the activities of both fixed and open-state together. There is nothing different about mixed-state notation from that of fixed-state or open-state, only that it combines the grammar of both systems.

A minimum level of intention is required in order to be able to manage these forms of activities, so we do not consider them universally accessible for everyone. Technically, there is a way to notate these systems of dissociated play, however, the complexity of their interactions make them easier to explore through experience and experimentation rather than notation.

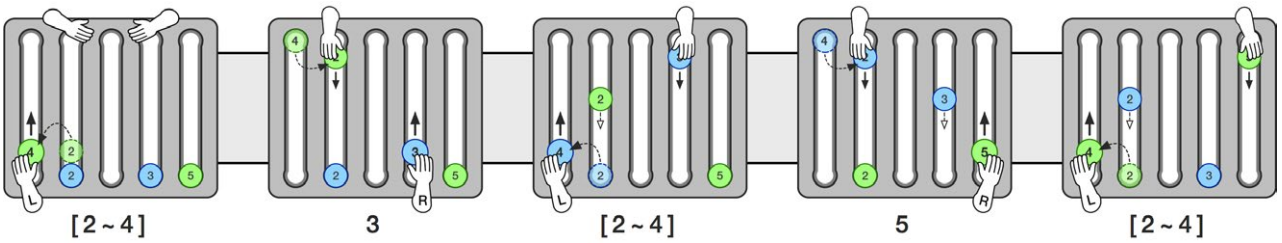
This being said, here are few examples of mixed-state illustration to give an initial idea of how the relationships can be applied and the ways in which their notations are written.

EXAMPLES

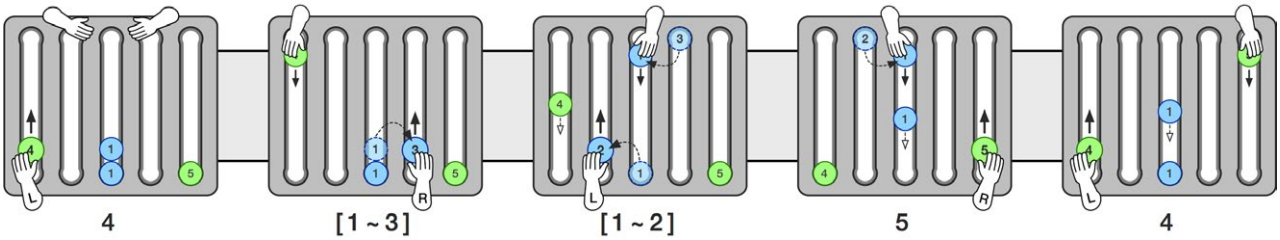
Forward Asynchronous Lateral, 2[3~5]4[3~5]



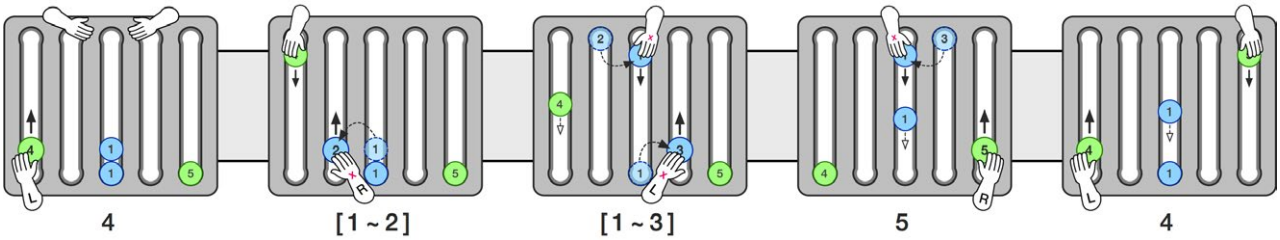
Forward Asynchronous Lateral, [2~4]3[2~4]5



Forward Asynchronous Lateral, 4[1~3][1~2]5



Forward Asynchronous Lateral, 4[1~2][1~3]5



CHAPTER 17
PRIMARY COMPOSITION

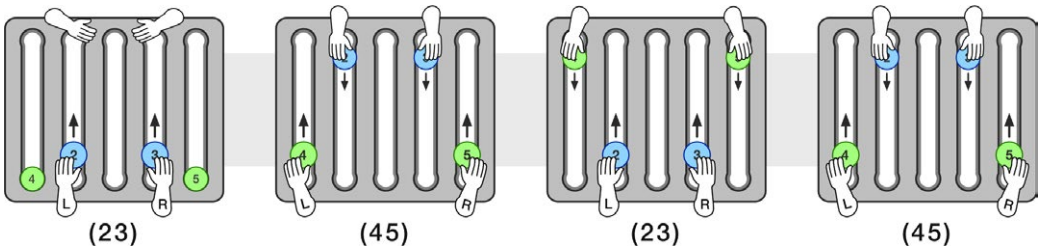
The primary composition is a notated order of activities which is particularly designed to facilitate the fullest spectrum of our associated relationships with space and time. Its development is based on the theory of process formations, and it is intended to be facilitated in its entirety, without any interruption. This allows us to construct continuous rhythms of social engagement, which is a critical component towards our ability to deliver facilitations nonverbally.

Another intention of the composition is to structure the cognitive outcomes of its developments, so that they occur most naturally and without resistance. This is a task which involves the calculation and ordering of all possible neurological sequencing outcomes, in reference to their geometrical forms in space and time. Based on this principle, each pattern of notation can be deconstructed and developed within the compartmentalised frameworks of synchronous lateral, asynchronous lateral, synchronous bilateral, and asynchronous bilateral.

The primary composition utilises a structure of five base patterns, which are meant to represent the widest possible range of our binary sequencing relationships. With the exception of pattern five, these activities are notated and discussed in terms of their base formation, which is said to be synchronous lateral. Each pattern is specifically chosen and organised for its ability to stimulate and/or encourage different forms of spatial sequencing relationships to occur.

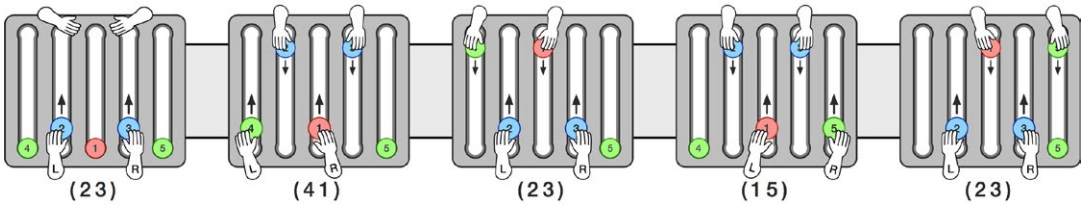
Patterns are identified and discussed in terms of their number, which we assign in the ascending order of their complexity.

Pattern-1, (23)(45)



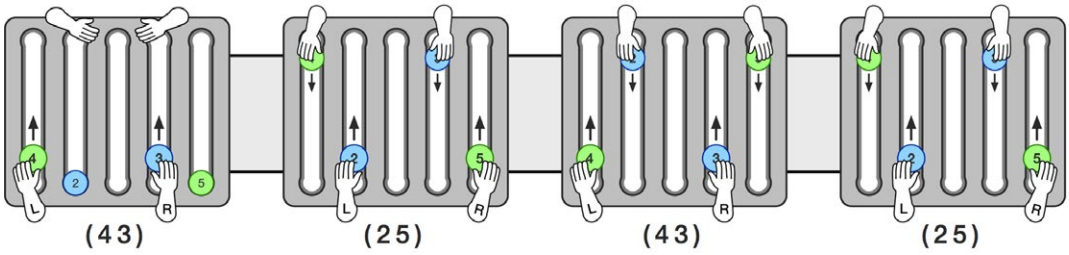
Pattern-1 represents the most simplified form of any relationship with juggling, and it is comparable to that of what we would call a "4-ball synchronous columns" pattern. In this situation, each side of the body moves in opposite directions, from that of the other, which produces a form of reflected symmetry that allows us to consolidate the sequencing of its information.

Pattern-2, (23)(41)(23)(15)



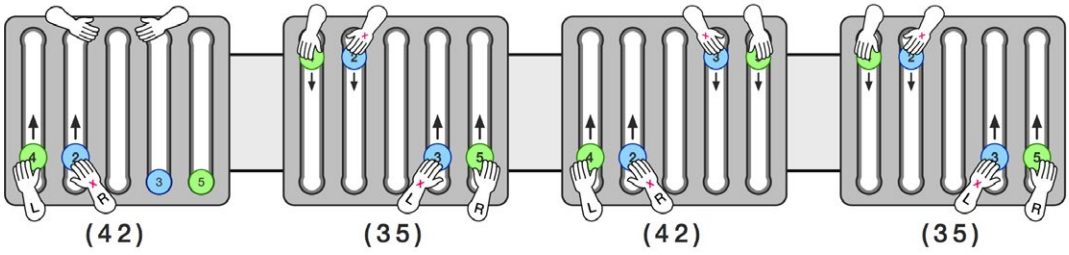
Pattern-2 includes an additional two beats of interaction, and is intended to encourage equal amounts of spatial sharing between both sides of the body. In this situation, the distance between sides does not change, and both sides of the body move in the same directions, at the same times.

Pattern-3, (43)(25)



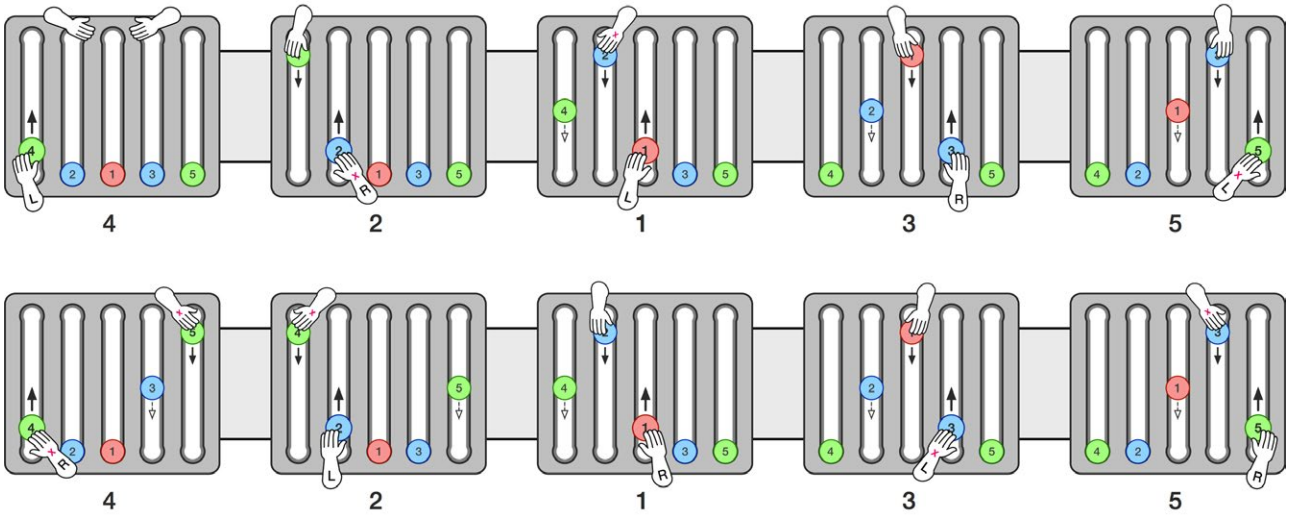
Pattern-3 is another sequence of activity in which interactions change their locations in space, but not their distances apart. Sequencing of this activity is very similar to that of Pattern-1, but with the structure of its composition being asymmetrically reflective. This causes more of its experiential information to be processed bilaterally, as the brain attempts to make comparisons between the geometries of both sides.

Pattern-4, (42)(35)



The relationship of **Pattern-4** mirrors that of Pattern-3, but with less distance between sides, and greater levels of bilateral sequencing involved. In this situation, one side of the body is always required to cross over into the space of the other. Technically, this makes its formation bilateral; however, due to the effects of its geometry, our senses actually interpret its experience as being lateral.

Pattern-5, 42135*



Pattern-5 represents a unique state of sequencing activity in which both sides of the body interact with each location. This causes its sequence to alternate between forms of lateral and bilateral interactions, as each beat is constantly required to change from one side of the body to the other.

It is important to be aware that Pattern-5 is an odd period notation, and thus, includes two revolutions of its period prior to completing its entire sequence of events.

NOTATIONAL TRANSFORMATIONS

With this selection of base patterns in place, we are now ready to analyse the transformations of each notation's relationship to that of the theory of process formations.

Technically, there are a total of eight sequencing relationships which can be formed within the structure of each notation. These include both their associated and dissociated forms of interaction with space and time.

Signal conditions do not affect the outcomes of patterns, as they only relate to our comparison of their information between sides. What this means, is that we consider the conditions of space and time separately from that of signal, and categorize their interactions based on the following outcomes alone: synchronous, asynchronous, lateral, and bilateral. Synthesis of each of these potentials indicates that despite Juggling's perceived complexities, there are, in fact, only four possible ways to structure the binary outcomes of its interaction.

Assuming that the condition of signal is that of associated, the following diagram deconstructs and illustrates the primary transformations of all base notations, based on their relationship to the theory of process formations.

	Synchronous Lateral	Asynchronous Lateral	Synchronous Bilateral	Asynchronous Bilateral
Patern-1	(23)(45)	2345	(x23x)(x45x)	x.2345
Patern-2	(23)(41)(23)(15)	23412315	(x23x)(x14x)(x23x)(x51x)	x.2345

Patern-3	(43)(25)	4325	(x43x)(x52x)	x.4325
Patern-4	(42)(35)	4235	(x42x)(x53x)	x.4235

Pattern-5 is not included in this diagram, as its notation is automatically inclusive of all potential relationships with space and time.

CONSTRUCTING AND FACILITATING

Not every variation, of every pattern, needs to appear within the structure of our primary composition. This is because the goal of facilitation is to develop the highest level of sequencing capacity, within the fewest amount of steps possible. As the relationships of patterns progress, from one formation to another, the structure of their events in space and time do not change; only the outcomes of their interactions with us. This repetition produces a conditioning effect, in which each variation of notation acts to reinforce the sequencing behaviour of the next.

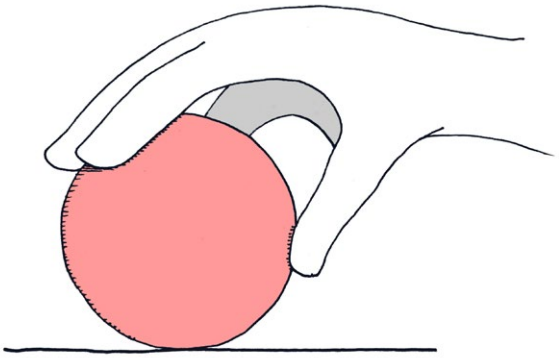
Notations are intended to be repeated for however long a participant needs to be able to develop their sequencing capacity of it. The only exception to this rule is in what we call a transition beat, which is performed only once, as a way to convert the sequencing of one notation into another. Transition beats are not often used in facilitation, as most patterns are able to be sequenced, from one to the other, without the need for extra notation. Whenever transition beats do appear, however, their condition is notated by the use of a small letter t placed in front of its own notation.

The primary composition includes three sections of facilitation, which are choreographed and designed to culminate in the expression of an independently managed 5-object cascade. This is achieved through a process of personalised facilitation and the use of very specific sequencing compositions, which take into account the widest range of needs, for the most amount of people. Each section of the composition is intended to develop a different set of functional capacities, and should be facilitated, as much as possible, without pause. A good way to begin practicing the composition, is to start by breaking it down into smaller sections first. This can be done by concentrating on specific groups of notation which are already deconstructed, in order of their formations.

There is a lot that can be said about the facilitation techniques of *Functional Juggling*, and how they apply to the delivery of our primary composition. These methods will be discussed more in the following chapter, however, there are two strategies which everyone should be aware of from the start. This includes the management of **hand positioning** and **tempo**.

HAND POSITIONING

Hand positioning refers to the manner in which facilitators interact with their objects. The best strategy for this is to relax our hands, as much as possible, with the fingertips extended and resting on top, and the thumbs placed behind.



This provides the highest level of technical control, and also increases the ability of our bodies to process and receive more sensory feedback information from each interaction. In order for this concept to apply, it is necessary that we make contact with objects while they are still in motion.

TEMPO

Tempo relates to the rate at which events occur in relationship to each other. This can also be thought of as rhythm, and its is a critical component of our ability to transmit information, and maintain engagement, without disruption.

There are many rates of tempo which can be applied to the interactions of *Functional Juggling*, however, for the sake of it facilitation we are primarily concerned with maintaining what we refer to as "balanced" or "harmonised" tempo. This is a state of interaction in which all of the forces between partners are said to be completely equal. We exercise this tempo by releasing and receiving our objects at the same time, and with the same amount of force, as our participant.

This creates a situation in which there are no sequencing gaps or overlaps between the processing of events.

Balanced tempos are also responsible for encouraging the stimulation of mirror neurons inside of another person's brain. Essentially, by imitating the frequency of our partner's behaviour first, we influence them to want to copy us back; and, this is where our communication strategy with them begins.

A good way to practice this idea is to try facilitating a few basic patterns with your eyes closed, and to use your sense of touch to gain more information about the other person's experiences. Ultimately, this level of facilitation takes time and practice to achieve, and can only be gained through trial, error, and many shared experiences with many different kinds of people.

COMPOSITION

The primary composition is a radically effective means of developing a person's sequencing capacity, well beyond what is required to manage the expression of a 3-ball tossing cascade. Given the impacts of such an experience, we highly encourage you to take your time, and work carefully, in developing mastery of its materials.

Below, you will find the notational lists of all three sections or the primary composition. Remember to break down sections into smaller components, of only a few notations at a time, when first practicing their activity. Another good way to think about the composition is to imagine it in the same way as learning a dance, because, essentially, that is what it is.

Please take your time, now, to carefully review and practice each section of the primary composition before moving on to the following chapter about its facilitation techniques.

Primary Composition

Section-1, Forward Fixed-State

Patern-1	Synchronous	Lateral	(23)(45)
Patern-2	Synchronous	Lateral	(23)(41)(23)(15)
Patern-3	Synchronous	Lateral	(43)(25)
Transition	Synchronous	Lateral	t.(41)
Patern-4	Synchronous	Lateral	(35)(42)
Transition	Synchronous	Lateral	t.(15)
Patern-3	Synchronous	Lateral	(43)(25)
Patern-2	Synchronous	Lateral	(41)(23)(15)(23)
Patern-1	Asynchronous	Lateral	2345
Patern-2	Asynchronous	Lateral	23412315
Patern-3	Asynchronous	Lateral	4325
Transition	Asynchronous	Lateral	t.4135
Patern-4	Asynchronous	Lateral	4235
Patern-4	Asynchronous	Lateral	4213
Patern-5*	Asynchronous	Bilateral	42135*
Pause	Communicate Synchronous Bilateral Behaviour		
Patern-1	Synchronous	Bilateral	(x23x)(x32x)
Patern-2	Synchronous	Bilateral	(x23x)(x14x)(x23x)(51x)
Patern-3	Synchronous	Bilateral	(x43x)(x52x)
Patern-3	Asynchronous	Bilateral	x.4325
Patern-2	Asynchronous	Bilateral	x.23412315
Patern-5*	Asynchronous	Bilateral	42135*

Section-2, Forward Open-State

Patern-1	Synchronous	Lateral	[23~45]
Patern-2	Synchronous	Lateral	[23~41][23~15]
Patern-1	Synchronous	Lateral	[23~24]
Patern-1	Asynchronous	Lateral	[2~4][3~5]
Patern-2	Asynchronous	Lateral	[2~4][3~1][2~1][3~5]
Patern-1	Asynchronous	Lateral	[2~4][3~5]
Pause	Communicate Change to Open-State Behaviour		
Patern-1	Asynchronous	Lateral	[1~2][1~3]
Patern-1	Asynchronous	Lateral	[1~2][1~3][1~4][1~5]
Patern-4	Asynchronous	Bilateral	[1~4][1~2][1~3][1~5]
Patern-5*	Asynchronous	Bilateral	[1~4][1~2][1~4][1~5][1~3][1~5
Patern-5.1*	Asynchronous	Bilateral	[1~2][1~4][1~2][1~3][1~5][1~3

Section-3, Horizontal Open-State

Patern-1	Asynchronous	Bilateral	(AB)
Patern-1.1	Asynchronous	Bilateral	(AB)(CD)
Patern-2	Asynchronous	Bilateral	ABC
Patern-2.1	Asynchronous	Bilateral	ABCDE

CHAPTER 18
SENSORY FACILITATION

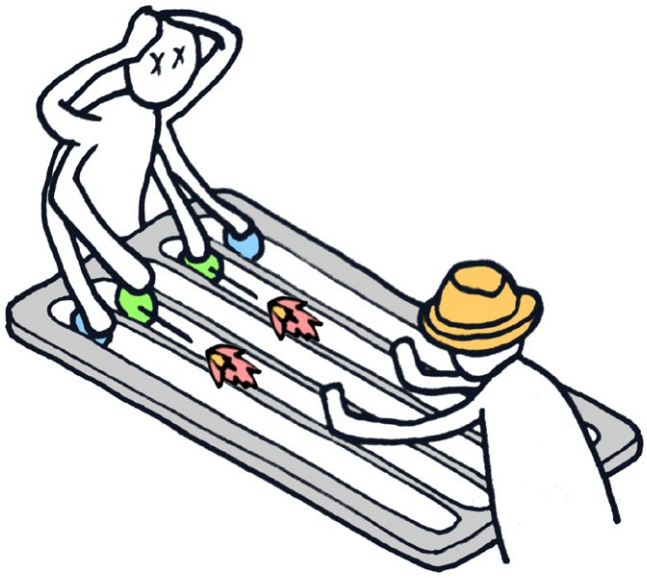
Now that you have some experience with the primary composition, we are ready to explore more of its facilitation techniques.

Management of *Functional Juggling* takes a different approach to learning than other methods, because it requires us to take a more active role in the self regulation of each person's sensory and emotional experience with juggling. We achieve this state of relationship by entering into what we call a shared system of tactile and rhythmic play with each participant. As mentioned in the last chapter, this is a process that involves careful attention to tempo and receptive hand positioning, to be able to receive and process more information about each participant's experience.

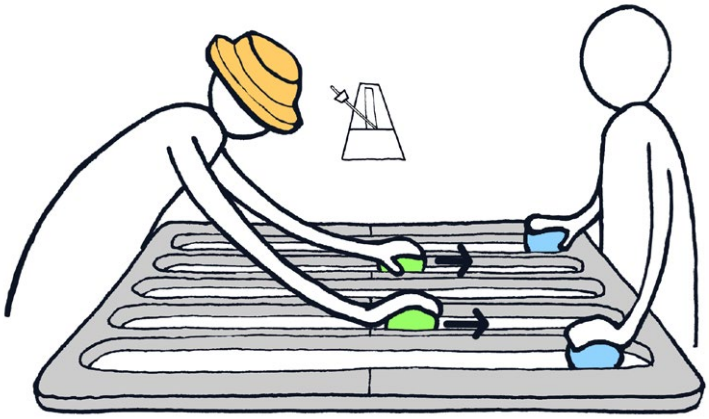
Essentially, as objects travel through space, they also carry tactile sensory information about our interactions with them. Individually, these sources of information do not tell us much about another person's experience, however, when sequenced together in rapid succession, they begin to form a sense of what we refer to as frequency. Frequency can be thought of as the ratio or balance of forces between the sequencing of events, and it is primarily what allows us to be able to process and communicate information during our facilitations.

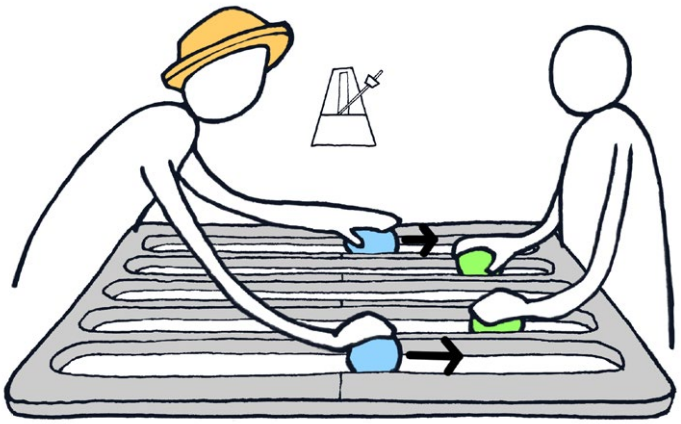
Whenever facilitating *Functional Juggling*, it is very important that we learn to imitate the natural frequencies of our participant's behaviours. In doing so, we create a relationship of balanced tempo with them, and allow each person to determine, or set, whatever level of challenge they are most comfortable with from the start. By harmonising the frequencies of such interactions, we enter a stage of facilitation in which we are subconsciously able to influence and guide the sequencing behaviours of others. This is because there is a natural tendency of the body to want to imitate the sensory feedback information of its environment, whenever engaged in rhythmic activity.

The three conditions which influence our perception of frequency the most are those of force, time, and distance. Obviously, increasing the amount of force applied to an object will decrease the amount of time it takes to travel a certain distance; however, this direct style of communication is not always the best way to influence another person's behaviour. This is because by amplifying the force of our interactions, we introduce larger amounts of energy into the activity, which can also cause over stimulation or even unmanageable levels of anxiety for some people.



The way that we counteract this influence during facilitations is to make use of the distance between us and the other person. Learning to reduce the amounts of force we use, in proportion to the distance that events must travel, allows us to neutralise the energy levels of an activity while still progressing the frequencies of its interactions.

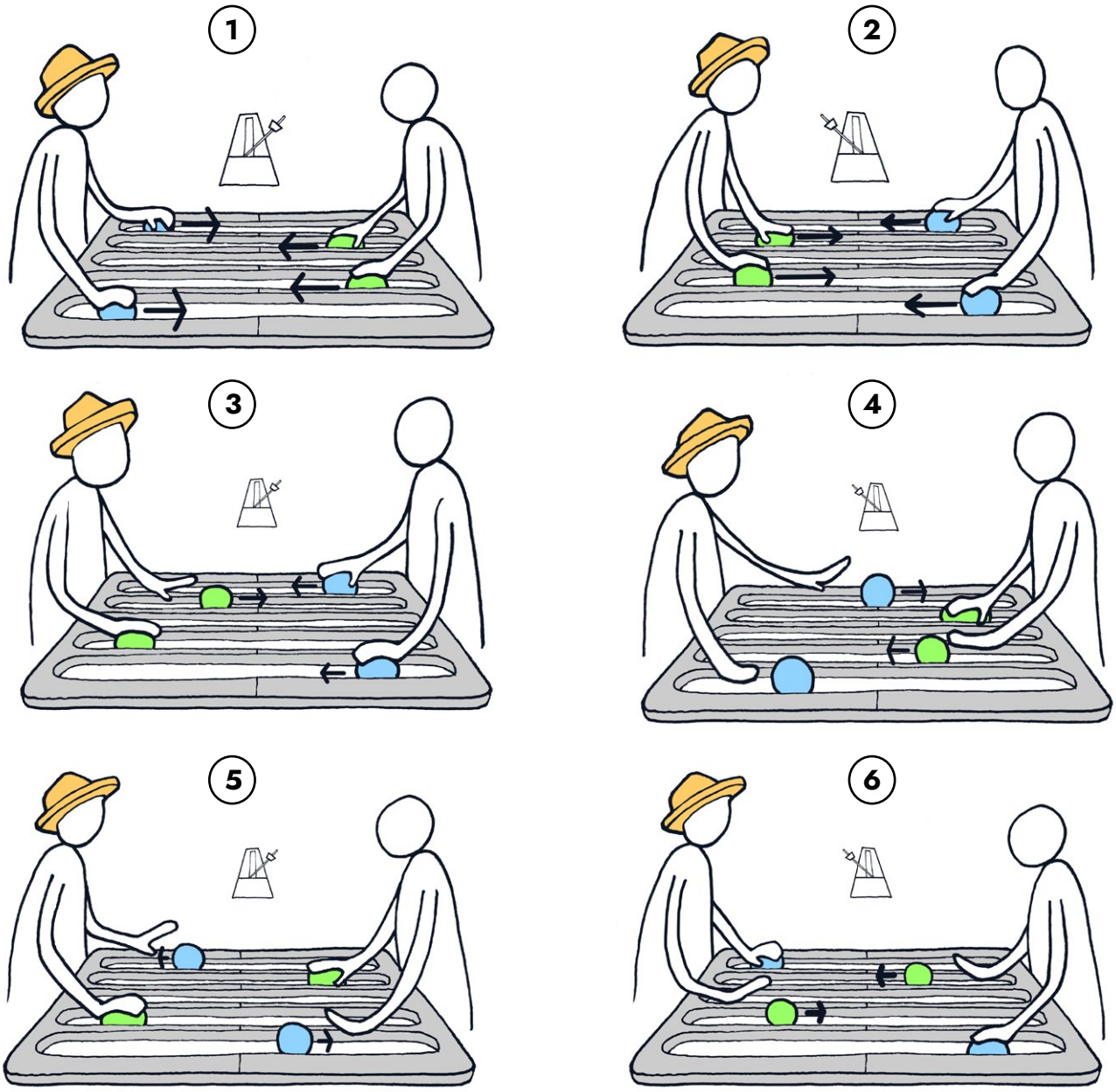




PACKETING

Packeting is a technique designed to assist in the transitioning of relationships between synchronous and asynchronous time. It is very common for a lot of people to struggle with making this change, and often they will not respond to the influences of frequency alone. In this situation it is necessary to apply the technique of packeting, which takes the relationship of time from one condition, and gradually transitions it into that of another, without having to stop or interrupt its facilitation.

Anytime a person fails to respond to a sequence of asynchronous time, it means that they are struggling to process its condition. Packeting solves this problem by reinforcing and returning to the synchronous variation of its notation. From this point, a strategy of incremental change is applied to manage the transitioning of our relationship back to that of asynchronous. This involves a technique in which the frequencies of both sides are gradually separated, further and further apart, over time. Managing packeting in this way avoids interruption to the activity and maintains constant engagement, while transitioning from one capacity development to the next.

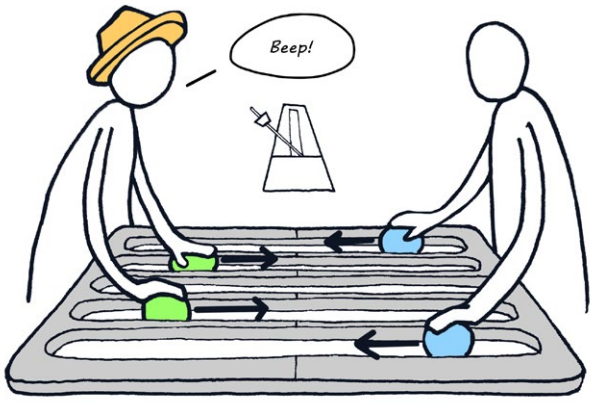


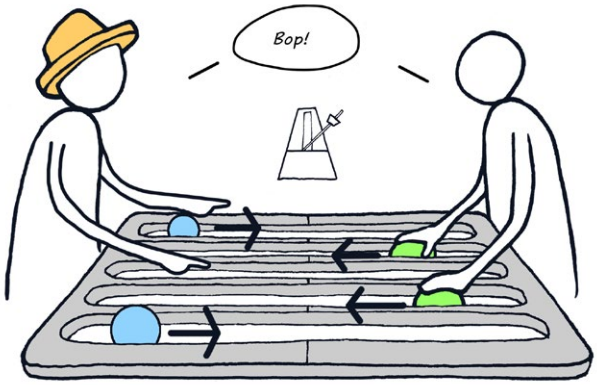
Another added benefit to this method, is that students are often unaware of its intention, or that they are even being influenced by it at all. From their perspective they are simply responding to a seemingly never-ending series of events, with no clear objective in sight other than to interact. This lack of expectation inevitably influences people to behave more naturally, and to become more explorative within the process of their own learning. Another way to think about this strategy is that we want to avoid a student's awareness of being instructed, so that they can engage in a style of learning which is more similar to play.

GESTURE AND SOUND

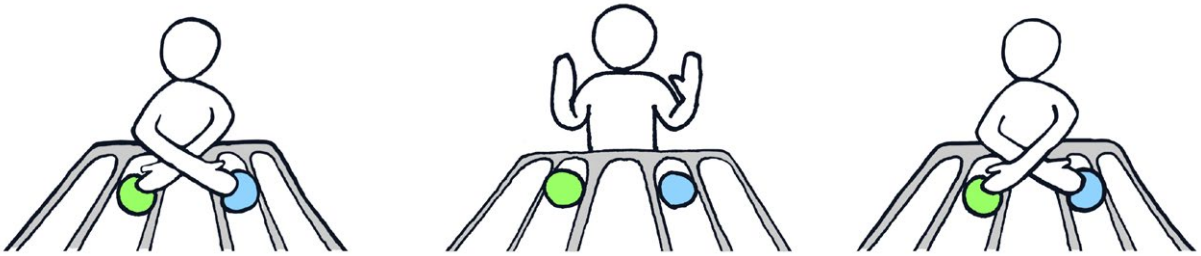
Speaking instruction during facilitation is not encouraged, and should be avoided as much as possible. This has a lot to do with the psychology of learning, because as soon as we communicate the intention of an activity, we also create an expectation for its performance as well. Learning occurs best when it takes place in an environment of play, and this is the intention of our facilitation.

Gesture and sound are great alternatives to speaking, and they communicate just as well, if not better, than anything else. These techniques can be applied during facilitation, however, learning to manage them, in addition to our own sequencing tasks, will require more practice of the primary composition first.

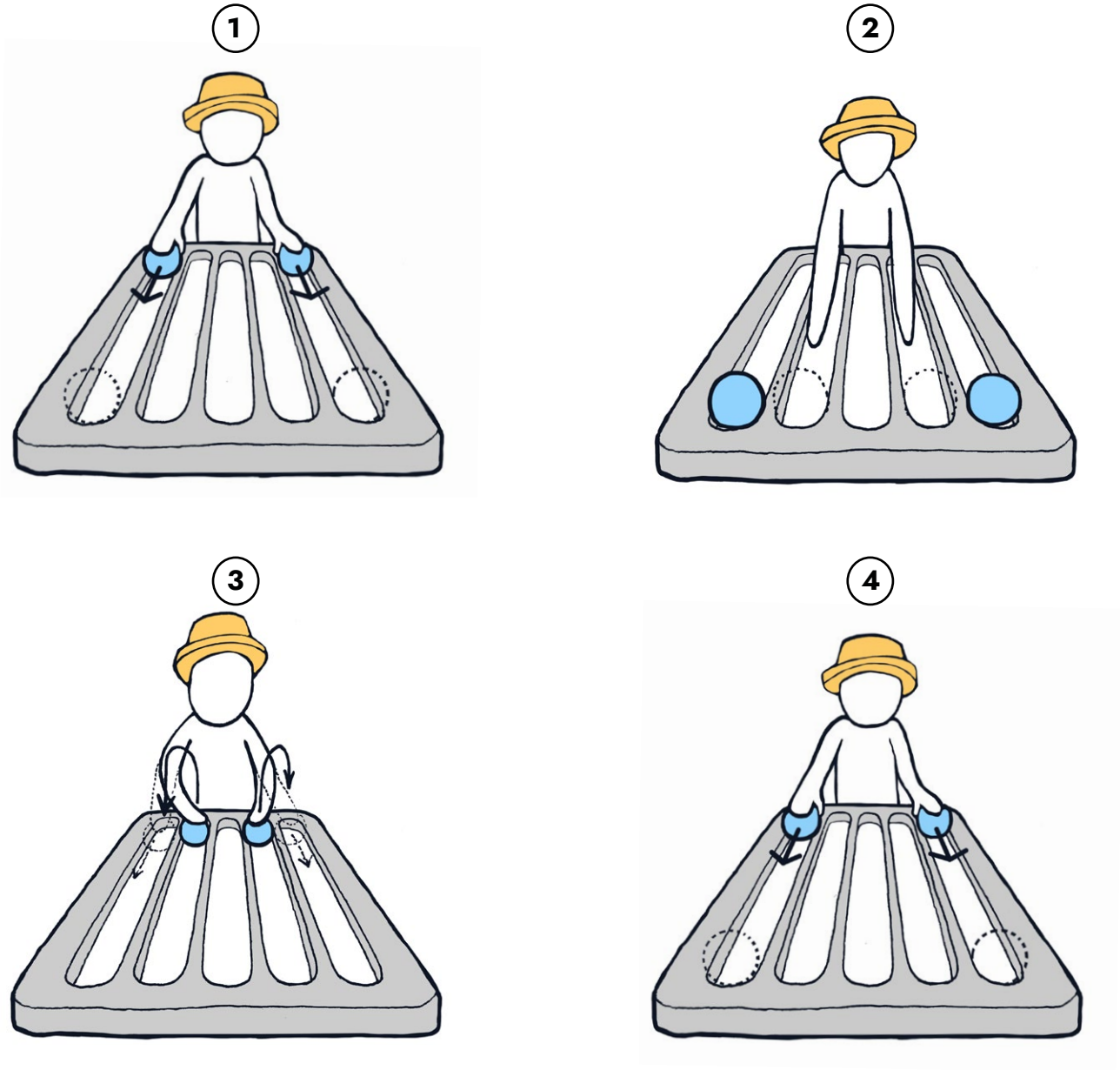




During delivery of the primary composition, there are two moments of its interaction in which the frequency of engagement must be interrupted in order to communicate the next stage of its behaviour. This occurs for the first time during the introduction of synchronous bilateral activity, as the crossing and uncrossing of arms is a slightly more complex relationship to explain without the use of gesture.



Another occurrence of this strategy is during the introduction of our open-state activity. Here, the form of interaction changes dramatically from what it was before, and there are no intuitive ways to guide the transition of its behaviour without the use of gesture.



Keep in mind, that the frequency of engagement also equates to the emotional experience of another person's interaction with us as well. Frequencies of greater amplitude are interpreted as expressions of anxiety or stress, whereas those of lower magnification are considered to indicate a sense of fear or self-consciousness. As facilitators, it is important that we take responsibility for regulating the emotional outcomes of each participant's experience with juggling, and this is something we achieve through complete manipulation of the activity itself.

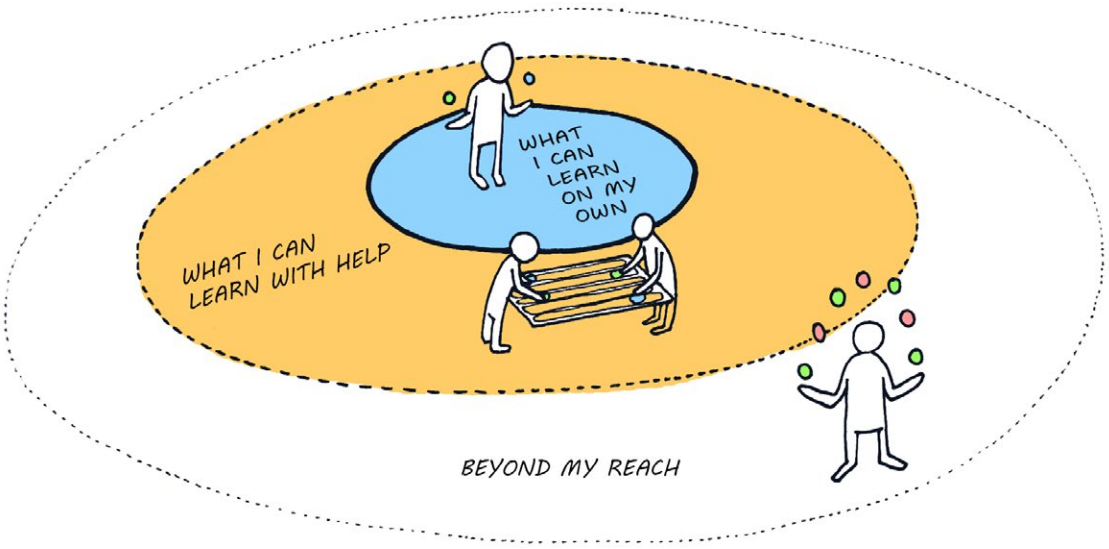
FLOW STATE STIMULATION

As discussed earlier, our experience of juggling can be defined by the state of mind which it produces: **global activation**.

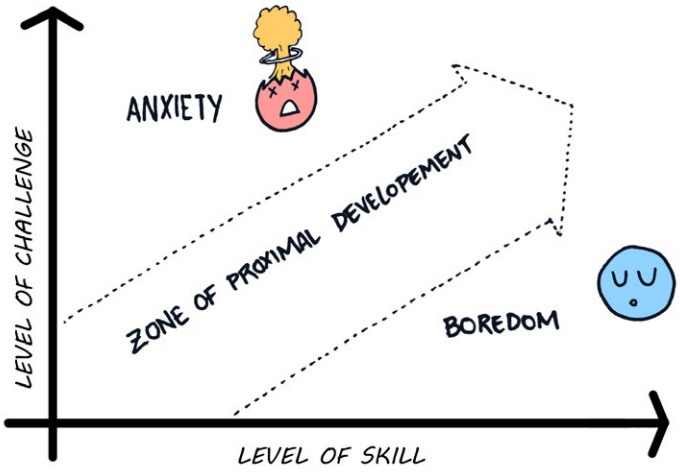
The behaviours of our brain and sensations of our body during a state of global activation are very similar, and associated to the experiences of what we would call a **flow state**. During a period of flow, a person's body and mind will give up resistance to the influences of their environment as they begin to process and interact with it more and more, as an extension of themselves. Flow state is not some form of magic or mythological interpretation of science; it is a real thing, and it has a dramatic effect on the way we are able to learn, process, and store new information. Although this is going to sound like a shocking claim, it is actually the intention of all facilitations to be able to trigger this exact state of mind. The experience of juggling cannot exist without a state of global activation, and global activation is a byproduct of flow. Thus, if we want our participants to experience juggling, we will need to activate some level of this stimulation for them.

There is a formula to this kind of relationship with reality which is already built-in to the structure of our facilitation techniques during the primary composition. You could actually skip this part entirely, and still be able to stimulate global activation during your facilitation, without even knowing it. This is one of the greatest possible outcomes of a student's experience with juggling, because it means that they have entered a different state of mind which exhibits zero resistance to the sensory feedback information of its environment. Under such conditions, we notice that students progress at much faster rates than before, and this is something you will certainly notice in your own facilitations as well.

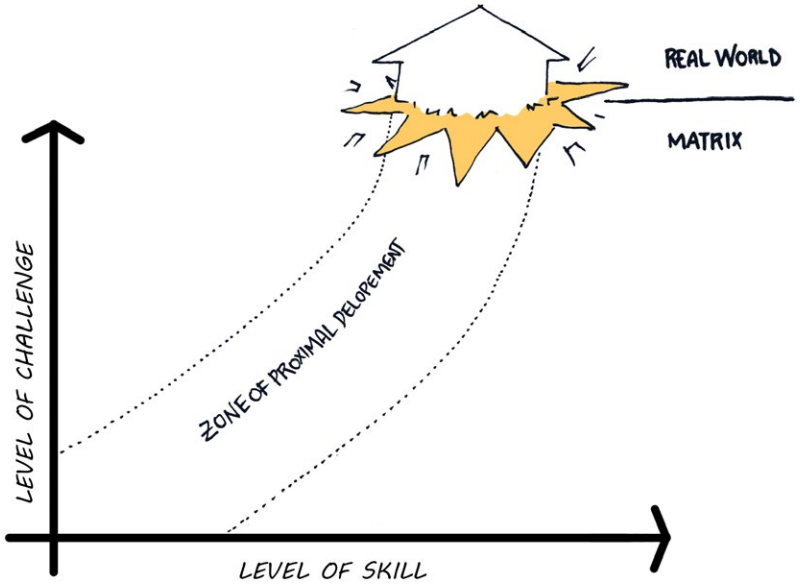
Activation of flow state can be recognised as the instant a person's frequency becomes completely harmonised with the interactions of their environment. This is detected in facilitation through the tactile sense of objects, which helps us to paint a picture of the other person's experience. At certain moments of progression during facilitation, you will notice a tightening of tension in the other person's body as the rate of frequency increases. In order to stimulate flow, it is necessary that we learn to challenge this resistance in our participant's behaviour as much as possible, but without allowing them to actually fail or lose control. This is a concept which relates to an educational model known as the *Zone of Proximal Development* (***ZPD***). ZPD can be thought of as the distance between what a person is able to do now, and what they could, potentially, be able to do next.



Generally, when we plot this theory into a graph of its expected developments over time, we end up with a relationship that resembles the expected outcomes of linear scaffolding.



However, when applied in the context of uninterrupted constant engagement of peak performance activity, as is the case with the primary composition, the stimulation of a flow state becomes inevitable and the outcomes of the learning curve begin to resemble that of the following instead.



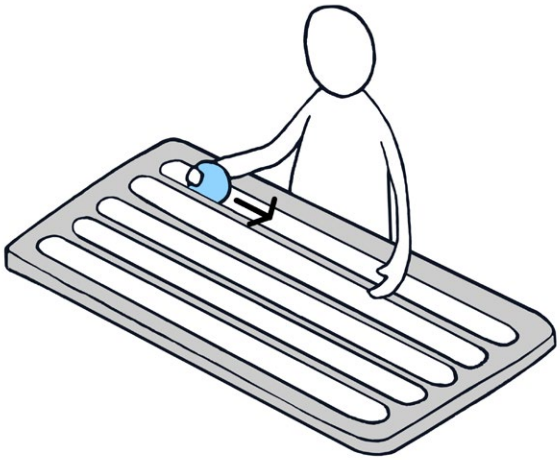
As facilitators our goal and responsibility is to be able to manage and regulate the precise level of every challenge, so that it fits within the highest limits of a person's ZPD. Too much challenge, and a student will experience failure, which leads to higher levels of anxiety and the production of stress hormones such as adrenalin inside of the brain. Alternatively, as students struggle to manage their activity, but are not actually permitted to fail due to the adaptations of facilitation techniques, they are also constantly being met with a positive sense of their own achievement. This causes the brain to release dopamine, which in combination with adrenalin, produces

the necessary precursors for any experience of flow. The longer we maintain these conditions without interruption, and the higher their level of challenge becomes, the more likely it is that a person will experience flow, and thus global activation as well.

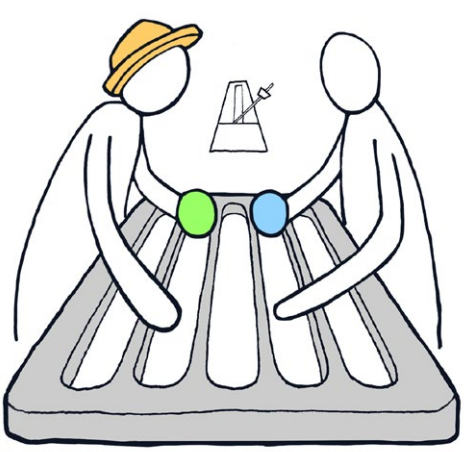
SOLO SOCIAL ACTIVITY

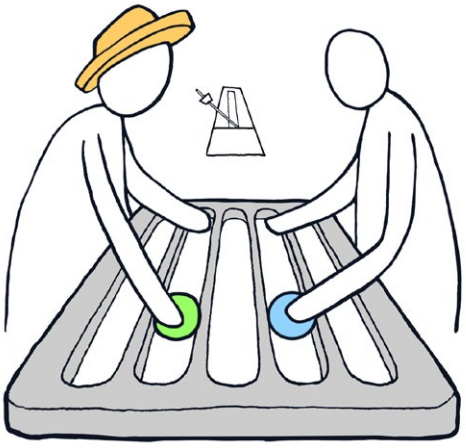
The primary composition begins with two sections of forward arrangement activity, which both involve the exchanging of objects back-and-forth between us and a participant. This gives us the ability to communicate physically with other people, and to influence the emotional stress levels of their experience during each facilitation. However, when transitioning from forward to horizontal arrangements, we lose this form of connection, and must begin to rely on alternative methods of communication instead.

One of the ways to do this is to structure a system of play that we refer to as **solo social activity**, which is intended to transition the tactile communication styles of forward arrangements, into the socially driven ones of horizontal. To begin this, we position the Juggle Board horizontally, so that participants can experience the sensation of rolling a ball back-and-forth, to-and-from, themselves.



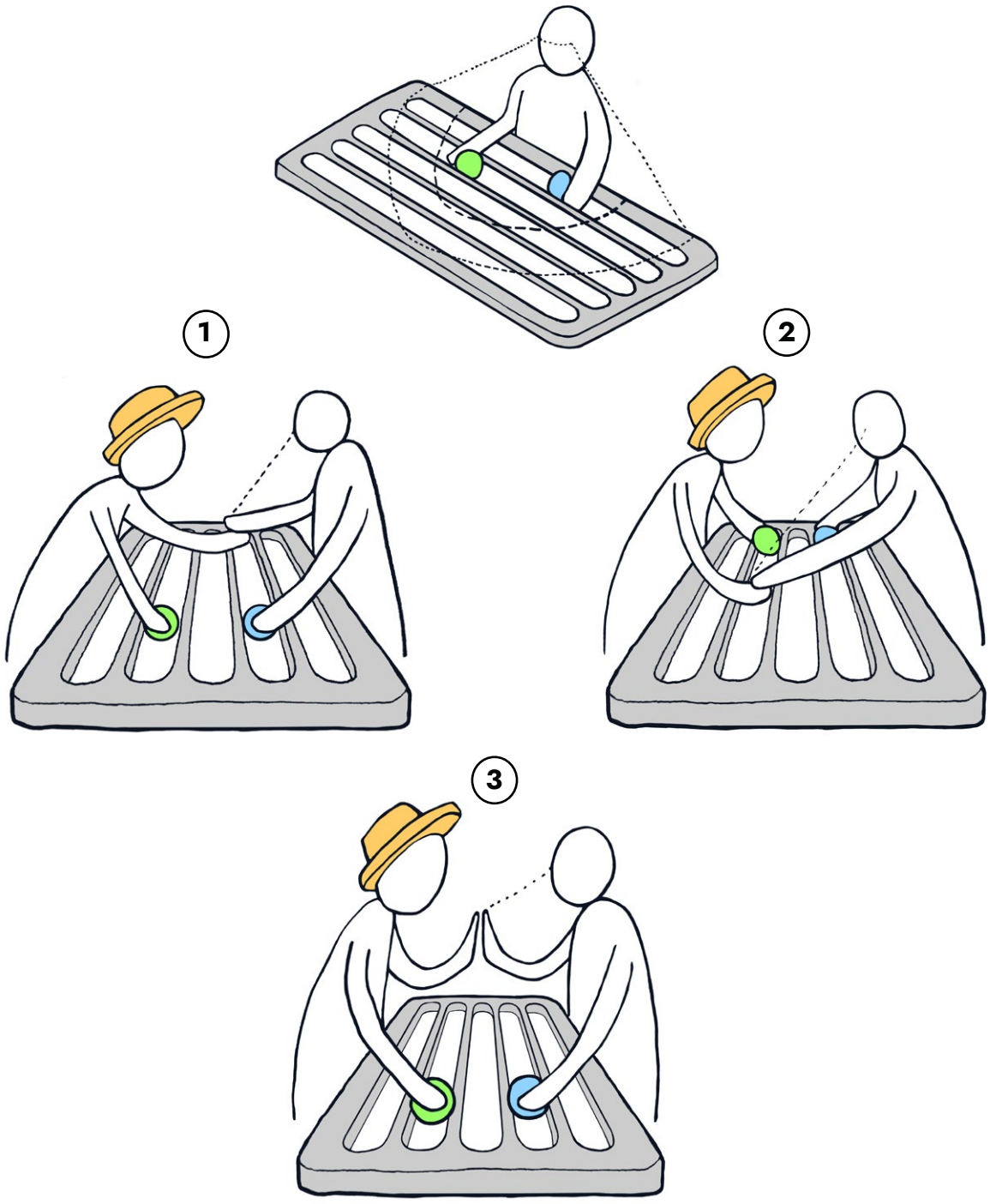
As students initiate this relationship with their object, we want to try to imitate the frequency of their behaviour from our side of the table as well. In doing so, we consciously and subconsciously encourage them to want to copy us, and this is where our new style of communication with them begins.





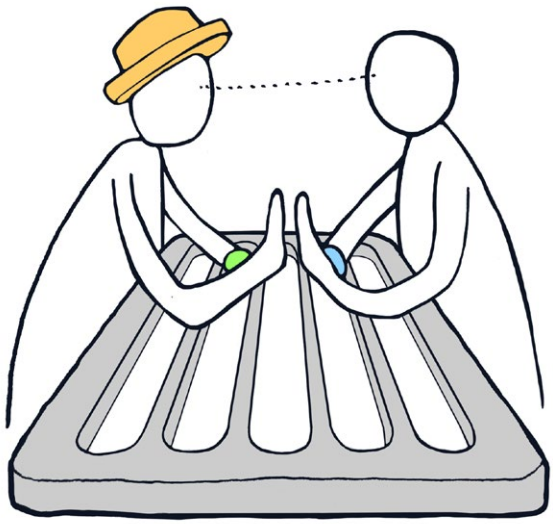
Initially, it is common for participants to want to be looking down at their hands rather than up at us, so before we are able to influence their behaviour socially, we will need to gain some level of eye contact from them first. We trigger this response by applying an opening sequence of behaviours which are intentionally designed to encourage more social interaction, establish the principles of play, and develop consistent eye contact with each of our participants.

Since the focus of most people's attention is downward, during the start of this activity we must begin by entering their personal field of vision. We do this by placing our hands in line with their ball, but on opposite sides of its interaction, so that while one side manages the ball, the other side manages an interaction with us instead.

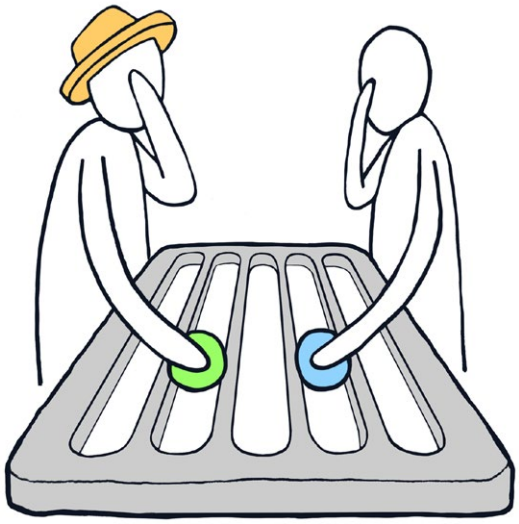


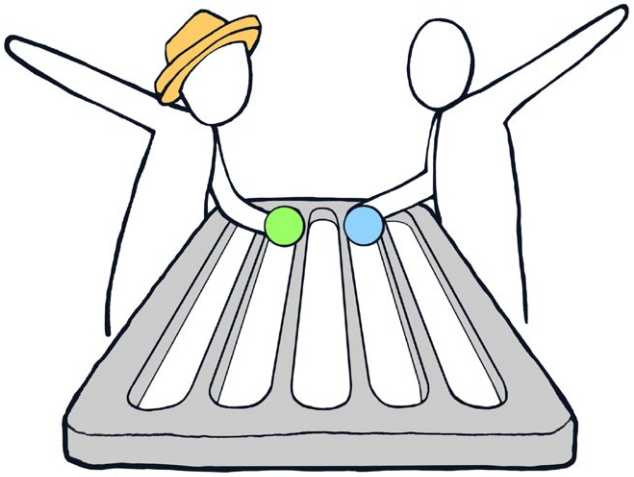
The idea is for participants to want to make contact with our bodies in between the sequencing of their interactions with the ball. This does not always happen immediately, and there are some people who will require additional encouragement before they are willing to respond. Once accepted, however, a student's brain will continue to want to harmonise the sensory influences of its environment, which now also includes us.

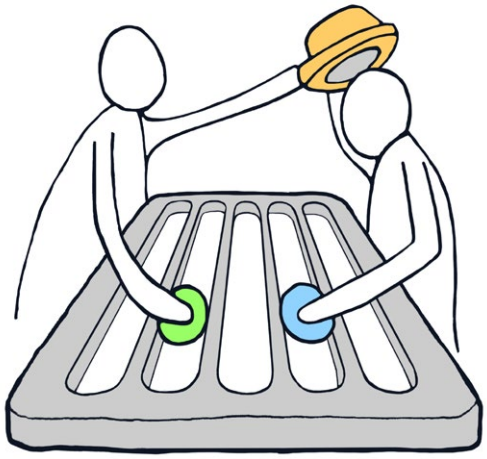
From this level of engagement, we can begin to move our hands away from the participant's field of vision, and up towards our face, as a way to gain eye contact with them. Eye contact is the solution to our communication strategy and once we achieve its outcome we can begin to influence each other's behaviour socially.



The idea of the activity is to encourage participants to want to explore more sequencing relationships with their environment, and for them to develop more social and emotional connections with us in the process. Facilitators should begin by making small and obvious suggestions of their behaviour first, such as the touching of different parts of our bodies and faces.

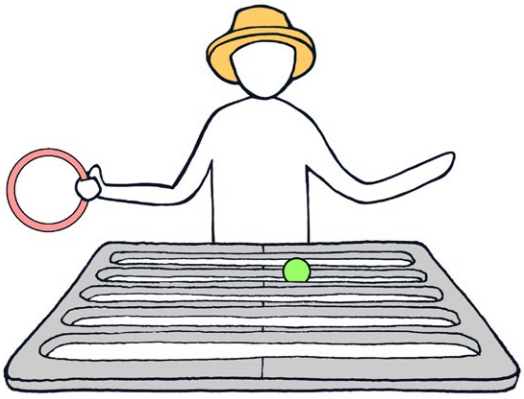


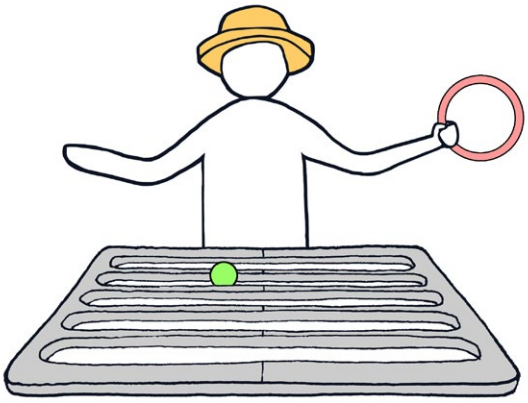


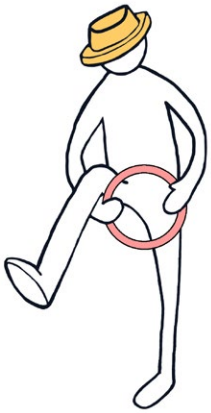


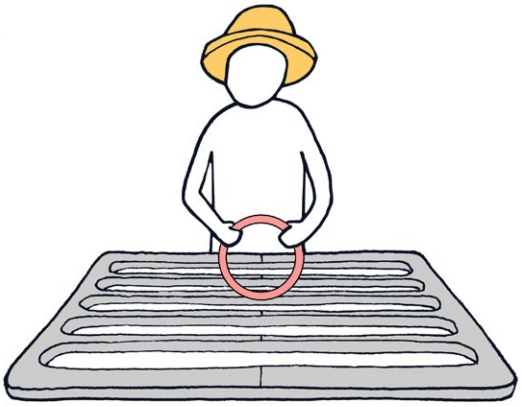
From here, larger and more complex sequencing motions can be communicated and applied in an infinite amount of ways. Basically, any form of action we want our students to perform, can now be communicated simply by doing it ourselves. This leads to a very creative and playful process of learning, in which participants are encouraged to make their own suggestions as well.

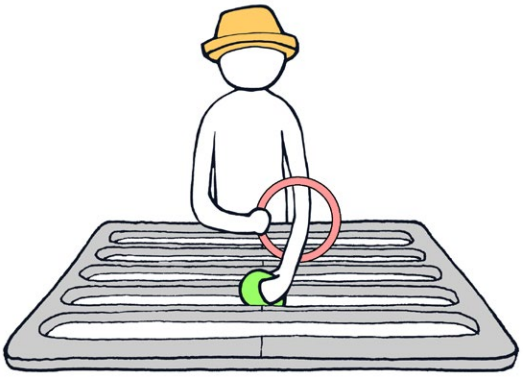
Another area of this activity includes the integration of functional objects, which increases the sequencing potential of our interactions and encourages more complex relationships to be explored. Any object which can be passed back-and-forth, between the hands of our participant, is considered a suitable item for this portion of the activity. Our preference is to start with a juggling ring, or some other object of similar size and shape, as it represents numerous forms of symmetry and is quite easy for our bodies to interact with.









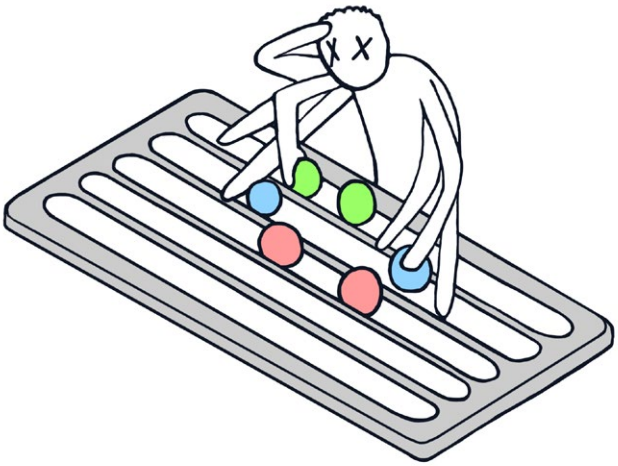


Ultimately, the purpose of this activity is to develop independent sequencing capacity, while simultaneously encouraging social play. This form of facilitation is particularly helpful when working with nonverbal participants, as its communication strategies are easily transferable into other situations as well.

Although seemingly simple in structure, solo social activity should never be underestimated for its potential to animate and diversify the movements of another person's body.

SUPPORTING INDEPENDENCE

The ability to experience juggling independently is the ultimate goal of every facilitation, and the culminating challenge of our primary composition. By the time students reach this level of their facilitation, they have already been prepared for all of the sequencing challenges which are about to come next. In fact, the sequencing relationships of horizontal activity are far less complex, and easier to manage, than those of forward arrangements. The difference in this situation, however, is that participants are now required to manage all of the influences of sensory information on their own. This has a tendency to lead to large levels of stress and hyperactivity for many participants, because the tactile inaccuracies of their own behaviours can now begin to influence them back.

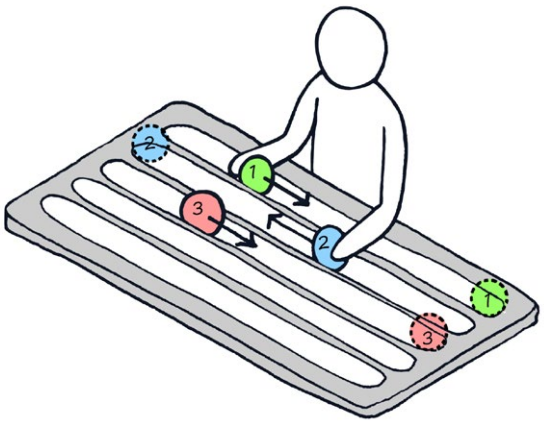


The best way to support this period of adjustment is to encourage students to stay calm and take their time in learning to process each step of the way. Additional influences, such as gesture and sound, are also helpful in communicating the initial behaviours of new sequences. However, it is important to understand that all of the sensory information which a student now needs to continue their process of learning is completely included within the experience of the activity itself. Importantly, what this means is that once a participant demonstrates the ability to sequence their activity independently (even if done so poorly), then the job of the facilitator is over. The only thing which is left to focus on now is our ongoing emotional support of their personal learning process. Generally, this comes in the form of verbal encouragement and positive reinforcement of their effort.

In some extreme situations, when participants exhibit particularly high levels of anxiety, it is a good idea to engage them in one of the following activities:

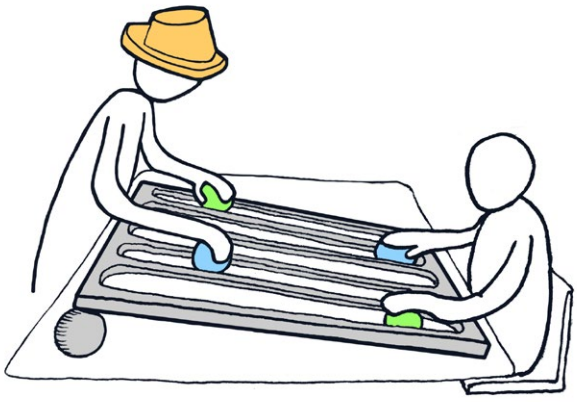
STATIC INTERACTIONS

One of the first strategies for reducing anxiety and improving our student's relationship with the frequencies of their environment is to allow each ball to come to a complete stop prior to attempting to sequence it again. This causes the frequency of its interactions to slow down, and removes our responsibility for having to harmonise with the sensory feedback information of its motion.



FORWARD INCLINES

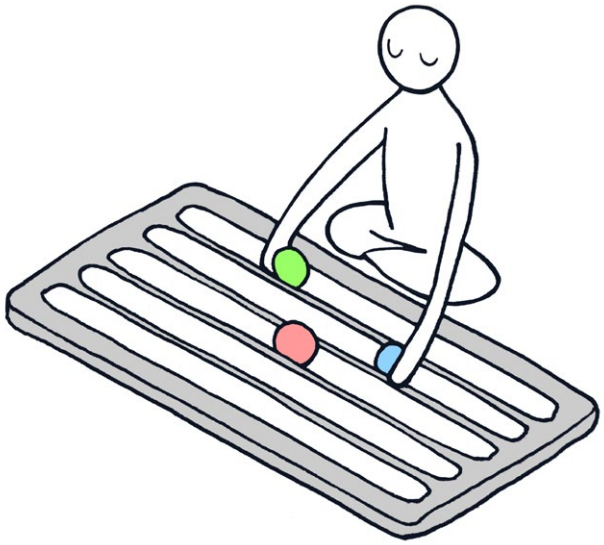
Another way to encourage this type of behaviour is to play with the Juggle Board on an inclined plane. This is a helpful way for facilitators to practice and develop their own proficiencies with the primary composition as well.



Playing with the Juggle Board on an inclined plane allows us to influence the frequencies of its interactions based on the degree of its elevation. Smaller inclines result in softer and lower rates of interactions, whereas steeper inclines require more force and produce higher levels of stress.

ABSENCE OF VISION

One of the biggest challenges in learning to accept our relationship with juggling is being able to communicate with it well. A great activity for developing this capacity is to have them perform the same exercises, but with their eyes closed. This encourages more sensory processing of tactile information, and forces participants to want to slow down their behaviour. In a lot of ways, this exercise can be thought of as its own form of meditation, and we encourage all facilitators to explore its experiences as well.



CHAPTER 19
FUNCTIONAL TRANSFORMATIONS

We have now reached the culminating point of our applicable theories about *Functional Juggling*. The goal of this journey has led us to a place where juggling can no longer be determined by the outcomes of its expressions alone. The formula we use to construct our experience of juggling can be described as it was in the third chapter: *a managed anti-entropic sequence of orbital events, harmonised by space and time*. This is the equation that we use to make the experience of juggling accessible for everyone. It establishes a limited order to the nature and structure of the relationships that we are able to form in partnership with the frequencies of our own reality. It should be said, in truth, that this definition of juggling is not exclusive to the creation of its activity alone, and that it also applies more broadly to many other forms of experiences such as music and dance, for example. In fact, juggling appears to be part of an ancient group of universal activities which have all withstood the test of time and rely on the same formulas of interaction to produce their unique states of mind.

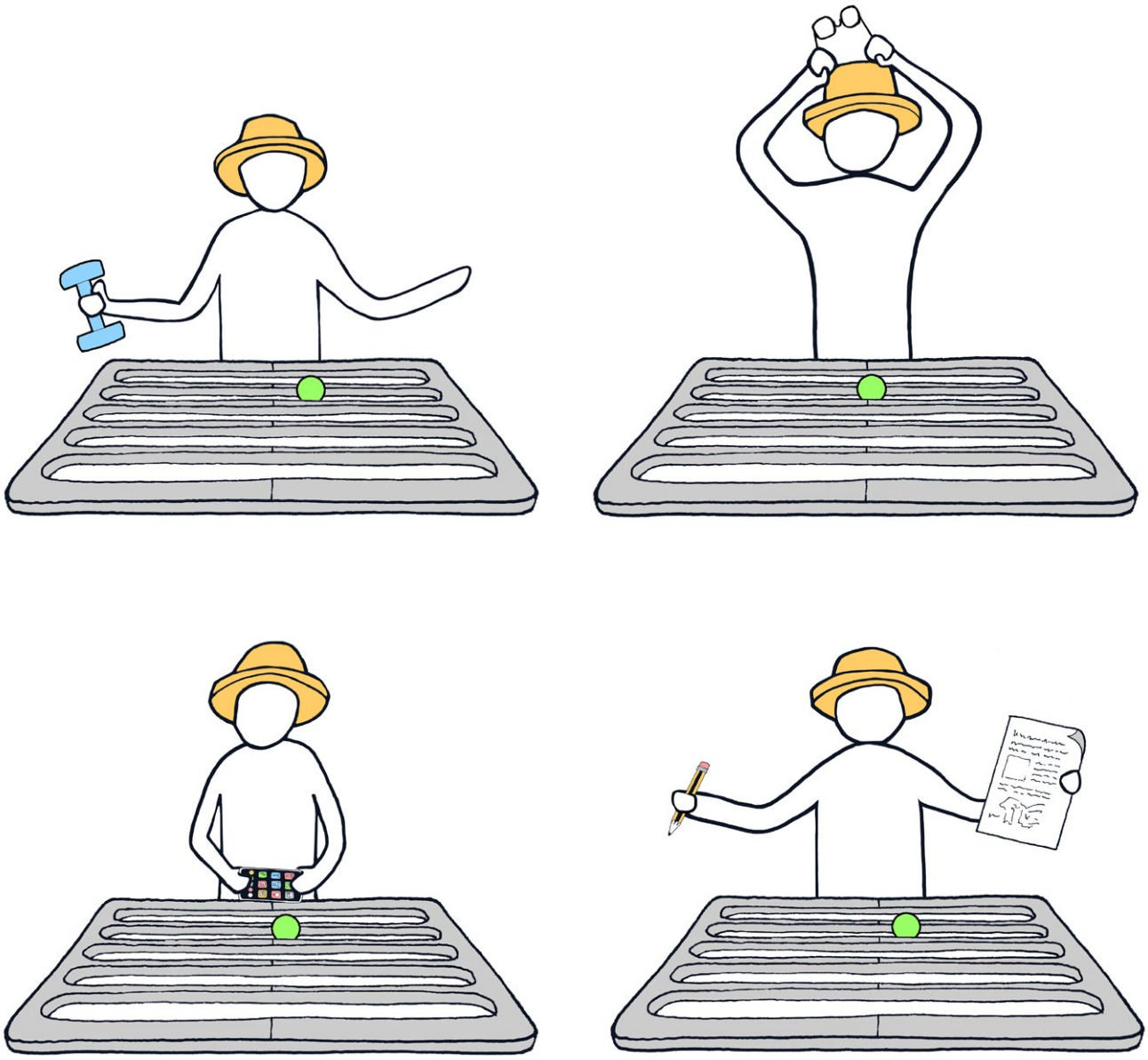
It goes even deeper than this, however, because the formulas used to produce such experiences are nothing more than a personalised projection of the universe itself. Essentially, we are the dust of stars, and within this dust hides the secret mathematics which govern the creation of everything, including ourselves. It goes to reason, therefore, that it would be a natural tendency of conscious matter to want to express and experience itself in relation to the formulas of its own creation.

Certainly, these ideas about juggling are starting to sound a little strange, and some of you might be thinking, at what chapter did we take a turn into crazy town? The good news is that in order to apply the outcomes and benefits of these theories, one does not need to understand or relate to the technical origins of their solutions. The formulas required to produce juggling have already been described and modelled for us, here, by the theory of process formations and our concept of spatial sequencing maps. All that is left to do now is examine the where, how, and why to integrate functionality into our existing frameworks of juggling.

SOLO SOCIAL TRANSFORMATIONS

We introduced the activity of solo social transformations in the previous chapter about sensory facilitation techniques. One of the greatest benefits of this activity is that it has an ability to be adapted and modified seamlessly without interruption or the need for verbal communication. This makes it a highly effective tool for generating time on task and repetition with whatever motor control movement or social behaviour we want our participants to practice.

By replacing the second object of this activity with something of functional value, such as a hair brush or sun glasses, for example, we transform the outcomes of its benefit into something much more than juggling itself.



Aside from its repetitious value, solo social activity allows us to engage participants in playful explorations of diverse sequencing movements, with a wide variety of objects.

In terms of pure clinical benefits, the outcomes of this activity produce the potential for up to 60 repetitions per minute (assuming a participant is not overly limited by other barriers). This may not seem like a lot, but it definitely adds up over time; often exceeding 600 repetitions per every ten minute facilitation while simultaneously developing bilateral sequencing capacities, stimulating global activation, and enhancing social and emotional communication skills.

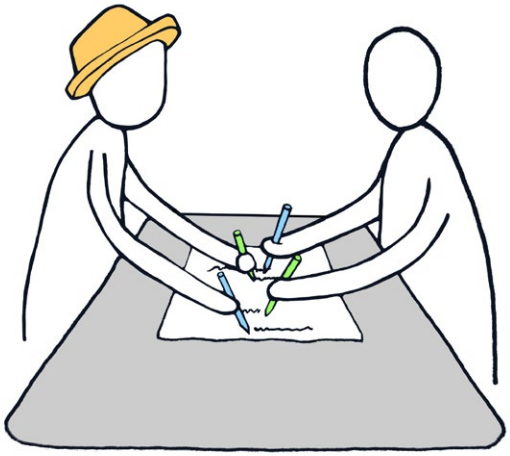
Without wanting to shame any other industries or boast too much about the effectiveness of this approach, it is very important that we recognise the unparalleled benefits and impacts that this type of engagement has to offer. Solo social activity is one of the most effective means of activating another person's body, through the use of juggling, and if there is only one activity that you remember from this book, we strongly hope that it will be this one.

NOTATIONAL TRANSFORMATIONS

Notational transformations are the application of spatial sequencing maps, such as the one used to construct our environment of the Juggle Board. Sequencing maps create the structure of our interactions with space and time, and notational transformations apply the relationships of the theory of process formations to them. This can be thought of in the same way as transitioning from juggling balls, to rings, to clubs.

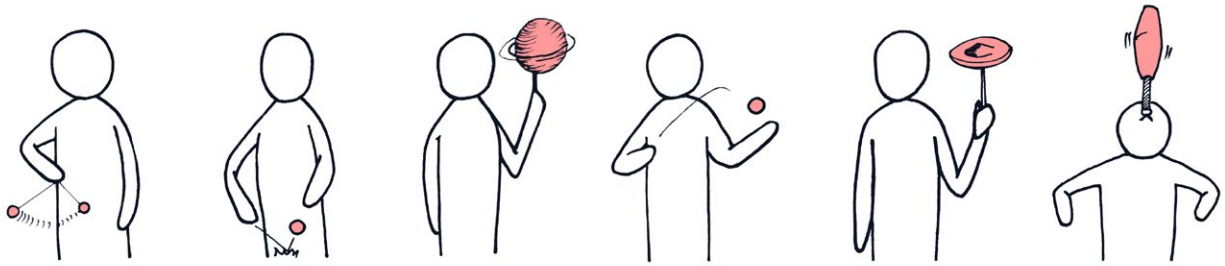
Spatial sequencing maps and the theory of process formations simply extends the spectrum of juggling, so that there are now more ways for different types of people to begin to access its experiences. Just like with solo social activity, the only requirement to be able to transform spatial sequencing maps is an ability to integrate other objects.

Two classical examples of this include the use of cups of water and crayons.



By replacing the action of rolling a ball with that of pouring cups of water or drawing with crayons, we transform the beneficial outcomes of these activities into completely new fields of therapeutic application. All of the sequencing materials of propswap notation and the primary composition are completely transferable regardless of the objects or movements we use to create them.

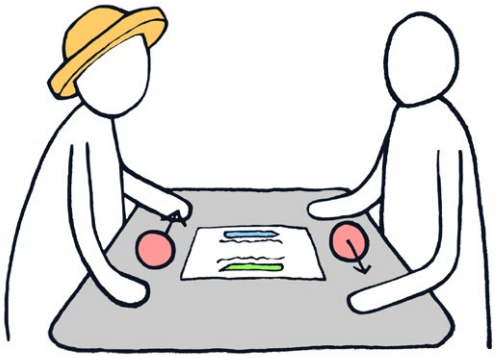
This being said, however, there are some forms of sensory interaction with juggling that are considered to be more naturally pleasing than others. This includes anything with a harmonic motion value, such as the sensations of swinging, bouncing, spinning, rolling, throwing, or even balancing.

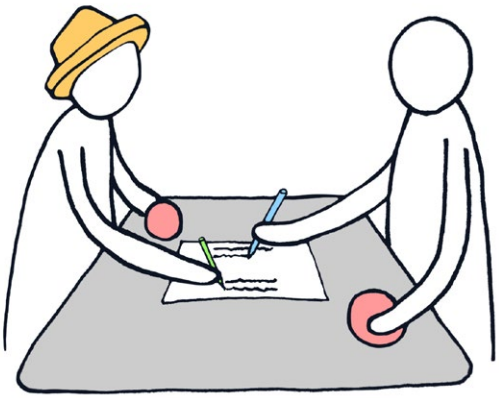


It is a common thought to assume that the relationships we form with juggling will have something to do with gravity, and this is an idea which seems to have shaped a lot of our misunderstandings about it. Gravity is the curvature of spacetime and as objects travel through it, they carry and absorb information about its existence. Objects at rest do not reflect as much sensory information about their spacetime experiences as do objects which remain in motion. Motion through space equates to energy and energy produces frequency, which is what creates the harmonics of our relationship to juggling.

Many adaptations of *Functional Juggling*, such as the examples above, do not require harmonisation of their experiences with space and time. We refer to these types of interactions as being static, and although they do not represent an authentic relationship to juggling, we are still able to utilise their experiences as a way to diversify the functionality of many activities.

Static interactions are often incorporated or mixed into other forms of engagement, such as solo social activity, which includes its own sense of harmonic influence due to the rolling of its ball back-and-forth through space.





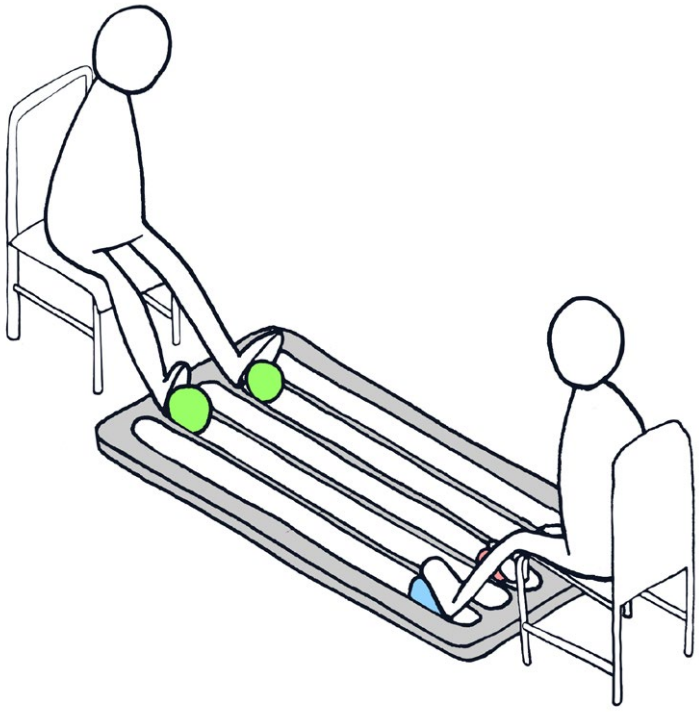
There are literally endless combinations and structures to these forms of functional and social interactions with juggling, however, ultimately whatever we choose to modify about our experiences, will depend on the intentions of our facilitation.

INTENTIONAL DESIGN

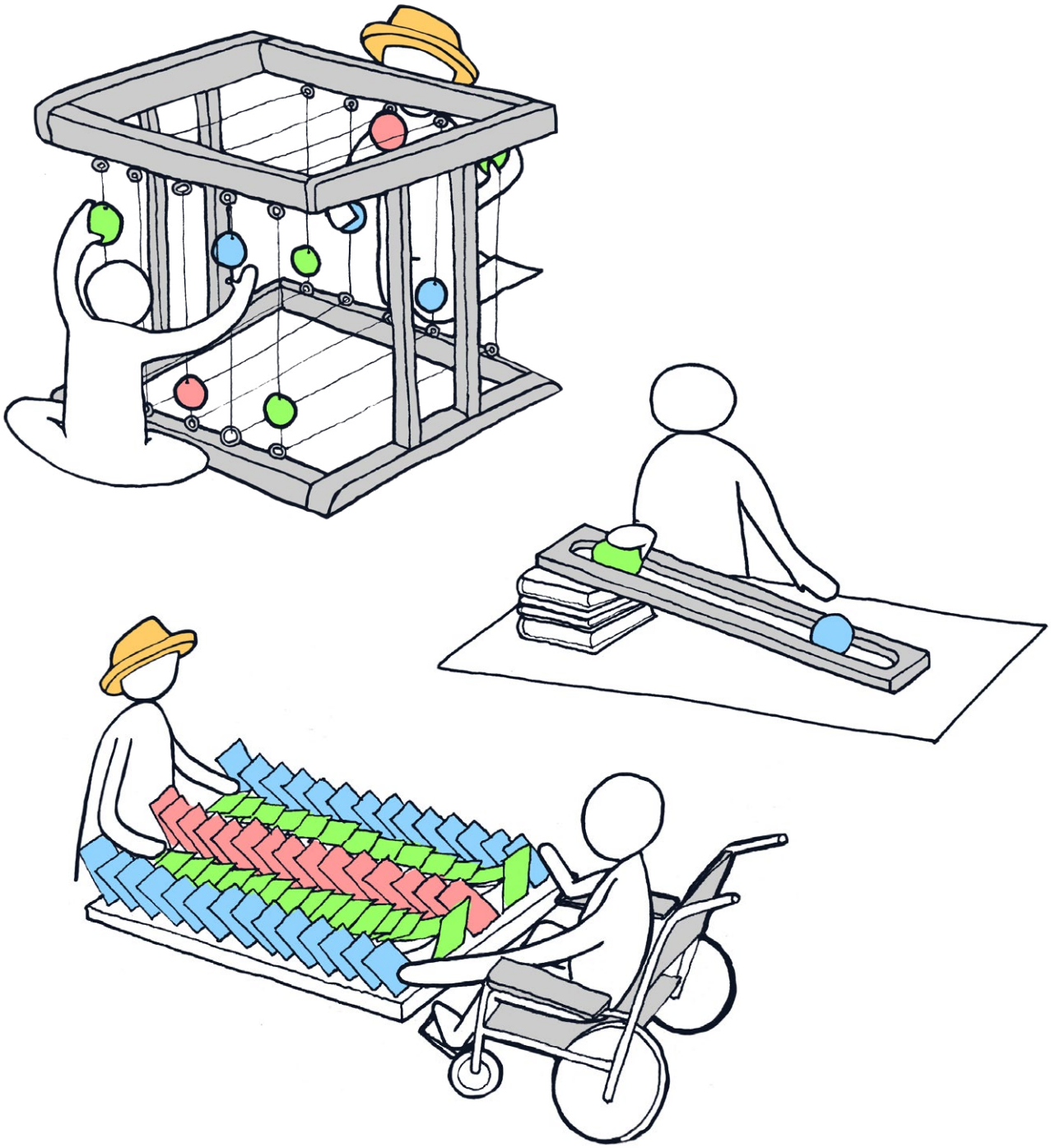
Understanding that our sensory relationship to juggling can be formed by any means of motion is a pretty big idea, with a lot of implications. The only problem with realising that juggling can be made out of anything, is that as we begin to take responsibility for designing its experiences, we end up in a situation, ironically, of having too many options to start with.

It is absolutely possible to discover new forms of juggling through exploration and play, and we often do this ourselves; however, as both artists and facilitators, we should be able to design with more specific intention as well. Designing juggling around the capabilities of each participant's needs, as opposed to their limitations, is one of the fastest and most intuitive ways we have for creating its experiences. This is because for whatever motion a person is able to produce, there will always be a way to connect that motion to a personalised expression of their relationship to space and time.

Take, for example, a person who does not have arms, or someone with the ability to grasp and release but not the capacity to roll or throw. Under such conditions, we would traditionally assume that such individuals would not be able to access the experience of juggling, however, in doing so we would be terribly wrong. The only thing required to stimulate juggling is a relationship of signals between the two cognitive hemispheres of our brain, which can be activated by any forms of motion from either side of the body. From this perspective a person with no arms could replace their means of interaction with that of using their legs instead.



And a person who is not able to roll or throw, could still produce their experience of juggling by any other means of interaction they are able to perform.



Designing juggling around the personal needs of individual participants makes it a relatively straightforward process. Basically, it is only a matter of determining what actions a person is able to produce and then using those actions to create juggling with them.

Another way to go about this process is to consider which specific capacity developments we want our experiences of juggling to be able to develop first. This is an approach that begins to highlight the many new directions of cross disciplinary applications which we are now able to explore through juggling.

Literally any capacity that requires repetition and time on task to be able to develop, can be integrated into an activity of *Functional Juggling*.

The true impacts of this statement are hard to rationalise and we expect that it will take many years before we are fully able to understand all of the potential applications of juggling. In the meantime, we invite every member of our growing community to participate with us in the expansion and exploration of these ideas, so that together we can continue to make juggling more accessible, for everyone.

CHAPTER 20
THE FUTURE

Understanding the reality that juggling is one of the most beneficial and accessible activities that anyone could ever try to do is a rather unprecedented notion to accept.

Juggling has been around for a very long time, and during that time it has changed very little. Historically, juggling has always been viewed through the external lens of its physical factors, and not by that of its personal relationships to space and time. This has led to a lot of confusion, debate, and misunderstanding, about what it actually means to juggle.

The contents and theories of this book are intended to challenge every preconception society has ever held about juggling. In doing so, there is a high probability that we are going to make some people angry. Being angry does not equate to being right, and we want to assure those of you who are experiencing such vitriol responses, that *Functional Juggling* is not here to take anything away from you or anybody else. Much to the contrary of this idea, *Functional Juggling* only serves to expand the existing spectrum of juggling as a way to increase its overall accessibility, and invite more people into its community.

Inevitably, this philosophy about juggling will only cause its industry to grow and reach new levels of appreciation within society. We sincerely envision a world in which the opportunity to learn how to juggle is as accessible as learning how to ride a bicycle or swim. In the context of such a world, we imagine that there will be more jugglers doing and creating more things with juggling, and we consider this to be a good thing.

As you may be aware, everything created and produced by the *Quat Props* community of functional jugglers is considered to be open source. This is a decision which directly defies the long-standing culture of professional juggling, which claims that people who discover ideas should possess ownership over those ideas, and that if anyone else wants to use them, they must receive permission first. Obviously, we strongly object to this limited perspective of materialism and have no problem with offending anyone in the process, as we view such opinions to be antiquated, misguided, and universally untrue. Anyone who disagrees or would like further explanation as to why we hold this truth to be so self evident, can refer to *Carl Sagan*'s famous essay entitled "A Pale Blue Dot."

Going forward it is important to understand that we are proposing to change the face and future of juggling for everyone. We recognise that this dream is not small, and this is precisely why we never imagined we could accomplish it alone. In order to manifest such realities it is going to take a lot of sharing and creativity from a lot of thoughtful and inspiring people, and this is where everyones' personal responsibility comes into play.

Our expectation in sharing the concepts of *Functional Juggling* is to inspire people to think more boldly about their own interpretations of the idea, and to provide a framework by which to begin to explore. It is not our goal to define the future of juggling for everyone, but rather to invite everyone to redefine it for themselves.

CHAPTER 21
GETTING INVOLVED

EQUIPMENT

As made clear by the concepts of *Functional Juggling*, specialised equipment is not required for the creation of its activities. The true idea of its practice is to be able to improvise juggling under any setting or circumstance so that we may better deliver its benefits to a wider range of people. This being said, there are several commercial options, as well as open source documents, which are available online to assist you in accessing and/or better understanding the primary tools of *Functional Juggling*.

It is important to note that *Quat Props* has no financial agreements with any of the manufacturers or distributors of the tools and equipment which we are responsible for imagining. This refusal to accept financial partnership is what allows us to maintain our independence and to be able to influence market growth, without the risk of bias due to personal interest. We consider this form of sharing to very much be a symbiotic relationship, as the ideas which we are creating require the accessibility of specialised tools and training equipment in order to be practiced and applied.

Currently, there are only two formal distributors of *Functional Juggling* equipment, which includes *Play Juggling* from Italy and *Cabeza de Martillo* from Chile. We expect more distributors to join this list in the coming years as the market for these forms of apparatus only continues to grow, and we maintain our collaborative support for any manufacturer who wishes to enter the market. This being said, special thanks and recognition is in order for the personal contributions of **Davide Cattaneo** of *Play Juggling*, and **Raul Oliva** of *Cabeza de Martillo*.

Davide Cattaneo was the first producer to approach the project with the idea of manufacturing easily available, high quality, and affordable commercial models of *Quat Props* primary apparatus: the *Juggle Board*. *Davide* brought decades of experience, innovation, and professionalism into the design process of *Functional Juggling* apparatus, and worked closely with us over a period of two years to ensure the highest possible quality of their first commercial model.

Raul Oliva played another significant role in the development and evolution of these ideas, with his more recent collaborative contribution of the modularly designed generation 2.0 *Juggle Board*.

Both of these individuals are responsible for imagining and introducing new forms of interaction with juggling, and we wish to thank them for their meaningful contributions to our community.

Play Juggling: https://www.playjuggling.com/

Cabeza De Martillo: https://cabezademartillo.cl/

The world is a very big place and shipping from either of these locations is not always a good option depending on where you live. In these situations, we recommend that you contact whichever circus equipment distributor already best services your local area, and encourage them to want to start to fabricate for themselves. Our community remains open to supporting any such interest and we seek no financial contribution in exchange, so it is very easy for us to assist anyone who wants to produce.

For those who are not interested in this option or would prefer the experience of constructing equipment for themselves, there are many ways to go about this process. The *Quat Props* website has several resource documents related to self fabrication of *Juggle Board* like apparatus, which can be constructed from a variety of materials (https://www.quatprops.net/diy). Additional information, such as video tutorials, can also be found on our *YouTube* channel, and we highly recommend that everyone investigate these resources as well.

The exact measurements of self constructed props can, and usually do, vary from one region to the next as material dimensions are not the same in all parts of the world. For this reason measurements should not be interpreted as literal instructions, but rather as guides. One of the most popular and accessible means for improvising the environment of a *Juggle Board* is through the use of PVC plumbing pipe. These materials are easily available and relatively affordable (especially if recycled), and require no serious training or technical ability to be able to construct. Special thanks to **Amy Elise Cohen** of *Circus Culture* in *Ithaca, New York*, for her contribution of this great idea, which has played a critical role in our ability to share *Functional Juggling* globally.

COMMUNITY

Over the course of its development *Quat Props* has formed a large community around the idea of using juggling as a tool for social change. This collaborative group of diverse thinkers has led to the creation of what we now refer to as the *Quat Props Collective*. Members of this community are positioned around the world and possess the necessary training and knowledge to mentor the growth of *Functional Juggling* within their localised regions.

If you are someone interested in developing *Functional Juggling* further or want to find out how you can become more involved in its community, then you should start by contacting your nearest Collective member (www.quatprops.net/collective). All Collective members have received in depth personalised training and mentorship from either **Craig Quat**, the inventor of *Functional Juggling*, or **Lapo Botteri**, his first apprentice and leader of the *European Collective* community.

CLOSING STATEMENT

Throughout the duration of this book I have been speaking on behalf of myself, Craig Quat, and the global community of leaders which has emerged around the ideas that I am sharing with you now. In absolute honesty and truth, I do not feel responsible for the creation of these ideas, although they do technically come from my mind.

The body of work presented here represents a decade of traveling and collaborating with communities of artists, educators, and free thinkers from around the world. There is no way that I could have ever imagined all of this material on my own, and I wouldn't have been able to share it that way either.

I would love to thank everyone who has participated in this journey with me and humbly dedicate the accomplishments of this book to all of the inspiring people whom I've ever had the honour to call my friends.

Cheers to everyone and I'll see you down the road.

Circoscopio - 1er Encoentro de Circo Social Inclusivo
Carmelo, Uruguay - Dec. 2019

"Internationally known as an innovator in the theory and practice of inclusive juggling, Craig Quat grew up attending a social circus after-school program. When, as a teenager, he started volunteering in the same program, teaching juggling and chess, "I fell in love with the rush of teaching," he says. But it wasn't until... 2010... that he was able to focus his calling. He saw a video on YouTube called Spark, in which master juggler Michael Karas juggles using an array of props and devices like a set of PVC pipes rotating around a fixed frame, and, says Quat, "it changed my life."

*Starting with his own version of Karas's "pipes," repurposed for educational use rather than performance, Quat is now a master of adaptive, or functional juggling, using creatively designed frames and other props to make juggling accessible to anyone willing to give it a go. He firmly rejects the notion that juggling is a skill reserved for an exclusive set of performers... Rather than an activity defined by the tossing of objects into the air, Quat would prefer the world see juggling as, in his words, "**a managed anti-entropic sequence of orbital events harmonized by space and time.**"*

Bayne M., December 11, 2018
CIRCUS TALK