Classical, Modern, Hypermodern: The linkage complexity theory

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Abstract

Existing prevalent structural theories are discussed, and we propose a new structural theory based on linkage complexity via Rotations Per Trick (RPT) that seeks to describe a continuing trend of linkages for the past 15 years, and to explain recent developments in the field.

1 Introduction

There are numerous structural theories for determining impact or complexity of a linkage or combo. The most prevalent is Zombo's Stability Theory, which has been re-hashed multiple times through the history of the hobby, most recently by Padrace re-branding it as "Tension and Release".

At the time of writing these paper, these theories tend to hold more incompleteness than completeness, which we describe later. The goal of this paper and the investigation of structural theory should therefore be to determine a complete system that observes some structural reality and can be used to measure the degree present in given sequences such as linkages or combos.

2 The issue with existing theories

The existing theories are not grounded in hard observable elements. For instance we will look at Zombo's Stability Theory as it is the basis of further writing and the most prevalent example in the pen spinning community. The theory inherits the principle of stability and instability from Music Theory, which naively only describes western classical music, and cannot account for structure that follows other theories.

The main issue specific in the theory is that the concept of sequences that provide stability and instability are entirely arbitrary. It can be argued that any sequence is either stable or unstable, or in the case of the Padrace re-branding: tense or released. It also wrongly assumes that you must then balance out these arbitrary elements, but why is this so? It is more limiting than guiding in this regard.

A structural theory should have some concrete grounding that avoids such disputes. A basic example theory would be to categorize combos into aerial majority combos or non-aerial majority combos, and then define the amount of aerials needed as 50% or greater. The combo that best fits the theory would be the combo with either the greatest percentage or total amount of aerials.

3 The linkage complexity theory

3.1 The historical complexity trend

The basis of the linkage complexity theory relies on the observation of a gradual trend in competition level pen spinning from the mid 00s to the present day. It can be observed that in the past, it was common to perform full charge rotations, full arounds, and the amount of rotations per trick would be around 1.0 in a given sequence. This can be observed when watching WT07, and it causes the sequences to appear slower, as there is less happening per unit of rotation in the combo.

Around 2011-2015, this can be seen to change. Spinners such as VicGotGame, Kagami and Fel2Fram began working on gradually more interrupted trick combinations, removing rotations and leading to linkages that had more complexity per unit of rotation.

Towards the end of this era however, development at the highest end stalled for many years. The average competition spinner quickly reached levels of complexity associated with Kagami's linkages, but the strongest spinners struggled to advance beyond even 2012 Fel2Fram levels of tricks occuring per unit of rotation.

In 2021, the beginnings of a new form of linkage began to emerge, first inspired by timing-based difficulty tricks like the moonwalk inverse side sonic. Tricks such as the *cthulu sonic* and the *PISS Around* showed a dramatic increase in tricks per unit of rotation. Where Fel2Fram would reside predominantly around 0.5 rotations per trick or a little lower, these new tricks allowed the possibility of 0.25 rotations per trick or even below that.

3.2 Classical, Modern, Hypermodern

The main idea of the theory is that there are three currently known categories of linkage with ranges of conical and around rotation per trick:

1. Classical - 0.75 RPT (rotations per trick) or greater
2. Modern - Roughly 0.5 RPT
3. Hypermodern - 0.3 RPT or less

The word "Hypermodern" of course is inherited from Chess, where the modern positional theory was proven to be defeated by the use of a new technique that relied on a non-positional theory. In the same way, Hypermodern cleanly unseats modern linkage complexity.

3.3 Instantaneous tricks

Instantaneous tricks are tricks that can be performed with no functional rotation. For instance, it is possible to perform an inverse side sonic without a charge or tipped charge motion, which causes it to have an RPT of 0. A seasick also has no rotations.

Hypermodern sequences will often chain tricks like this between or at the same time as tricks that have some rotation, giving the appearance that the pen is turning, but the number of sequences in that rotation may be double or triple the normally expected amount.

3.4 Valid tricks for measurement

Hypermodern linkages and hybrids demand performing simultaneous or instantaneous tricks at every stage. This is because the smallest unit of rotation in a typical trick is only 0.33, which occurs when a single section of a triangle pass is performed. To surpass this limit, we must perform multiple at once, or use instantaneous tricks as previously described.

In this regard, there are tricks that we normally associate as only a single trick, but in the structural theory we associate as multiple tricks in order to demonstrate the amount of complexity in a given timeframe. These special cases can be called *valid* tricks.

For example; both a sonic and a side sonic are considered to be a single trick. However, the side sonic is a subset of sonic that contains a finger 'pop' of the finger not acting on the pen, which in the theory we define as a separate valid trick. Ergo, the side sonic has an RPT of 0.5, while the regular sonic has an RPT of 1.0.

For the sake of sanity, tricks with two or more fingerswitches do not have the individual fingerswitches considered as separate tricks, so a sonic would not have an RPT of 0.5 due to the prevalence of two fingerswitches. Making these definitions becomes exceedingly complex, but as a simple rule, each individual non-fingerswitch trick is considered a valid trick, and side sonic 'pop' motion is explicitly considered a valid trick.

3.5 Examples

The PISS Around is a good example of a first hypermodern trick to attempt. It consists of a pass, then an instantaneous inverse sonic side sonic, followed by a release over the ring finger, which may be performed without a rotation. It can be performed statically or by turning the hand to provide the illusion of a rotation of the pen.

The complexity has to be visualised carefully to be understood. When the pass ends, within the same 0.0 unit of rotation an inverse side sonic appears, and a release into the 34 slot is performed optionally without an extra rotation, meanwhile a seasick is also performed during. The net result is that four tricks are effectively performed at the same time from the rotation perspective.

If the inverse side sonic is considered to comprise 2 tricks, the seasick 1, the 34 drop transition 1 and the pass 1, then 5 valid tricks are performed. If the drop transition is done without an extra 0.25 rotation, PISS Around has a *0.1 RPT*, which plainly shows why it is impossible to follow hypermodern linkages without slow motion. Even at 1 rotation per second, a combo performed with the same RPT as PISS Around would require the viewer to track *10 tricks per second*.

In the Pen Spinning World Cup 2022 Round 3 tag from Final Boss, Nine performed a 5 second clip where the RPT was maintained around 0.25. It is difficult to follow even in slow motion, and as of writing is the longest hypermodern sequence ever created.

4 Conclusions

The complexity theory of linkages is not a catch-all theory. It only describes a single, well-defined area of structure. However, in comparison to existing theoretical systems, it is much more concrete and is backed by historical reference.

The definition of hypermodern linkages opens up a new category for study for the pen spinning community, and it is likely that within the next few years the first competition-length hypermodern combos will start to appear. Their effectiveness is yet to be fully realised.