Visual Perception and learning complex Judo-Techniques

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Amount of Data Retrieved

When observing complex judo techniques, the amount of visual data retrieved is substantial. This includes movements, angles, speed, force application, and the interaction between opponents. Each demonstration involves numerous variables, such as body positioning, grip changes, and transitions between techniques.

Amount of Data that can be Processed

The human brain can process a significant amount of this visual information, but there are limits. Cognitive load theory suggests that only a certain (=small) amount of information can be processed at one time without overwhelming the observer. Effective processing requires focusing on key aspects of the technique rather than trying to absorb every detail simultaneously.

Filtering of Relevant Data

To handle the vast amount of visual data, it's necessary to filter out the most relevant information. Priorities are:

- focus and visual attention of the observer.
- big and fast movements have priority over small and slow movements, which have priority over unmovable parts (product of human evolution: in case of emergency we should be able to react quickly)
- expected details are more relevant then unexpected (question of focus)
- personal experience with the movements trigger expectations of the observer.

Mirror neurons

Mirror neurons are specialized brain cells that activate both when an individual performs an action and when they observe the same action performed by someone else. These neurons are thought to play a crucial role in understanding others' actions, learning through imitation, and developing empathy. Following points are important:

- personal experience is very influential on activation of mirror neurons
- mirror neurons play an important role in filtering visual perception

The "Snapshot Fallacy"

Snapshot fallacy is an artificial created term for the phenomenon, that certain states of a complex process like a judo-kata are stored as pictures (snapshots) in our memory. We find these pictures in books, in highlighted in videos or during demonstrations and explanations in seminars.

If we then want to execute the kata, these pictures set subordinate targets for our action, what can lead to a "proceeding from picture to picture" or from "snapshot to snapshot".

But these situations/states are usually the result of a combative interaction and not a target of a cooperative move. In this sense, ri-ai is what happens in between these states.

> Sadly many judoka miss ri-ai, because they unintendedly focus on the visual impression, but not on the functional process ("Snapshot fallacy").

It is important to mention, that these ideas are our own conclusions from longtime experience with kata and cannot be found in any publication.

Ways to Improve the Quality of Visual Perception without use of media

- Demonstrations must be **crisp and clear**
- **set the focus and attention** of the observers before the demonstration ("explain before show")
- do not explain too much at one time; better let everybody make some experience and then proceed with more details

Ways to Improve the Quality of Visual Perception with use of media

To enhance the visual perception of judo techniques, several methods can be employed by the instructor if media is available:

1. **Slow Motion and Replays**: Using slow-motion videos and replays to allow detailed observation of each component of the technique.
2. **Multiple Angles**: Providing views from different angles to capture all aspects of the movements.
3. **Step-by-Step Breakdowns**: Breaking down techniques into smaller, manageable parts for easier learning and absorption.
4. **Annotation and Highlighting**: Using visual aids such as annotations, highlights, and overlays to draw attention to crucial aspects of the technique.
5. **Expert Commentary**: Including explanations from experienced practitioners to provide context and emphasize important details.
6. **Repetition and Practice**: Encouraging repeated viewing and practice to reinforce learning and improve retention.

By effectively managing and processing visual data, prioritizing key elements, and using various methods to improve the quality of visual perception, learners can better understand and master complex judo techniques.

Additional aspects

Individual Differences:

The ability to process visual information and the speed of learning can vary significantly from person to person. Some individuals may have a natural aptitude for visual learning, while others might struggle more with complex visual information. These differences can be influenced by factors such as prior experience, cognitive processing speed, and individual learning styles. Instructors should be aware of these differences and be prepared to adapt their teaching methods to accommodate various learners.

Connection between Visual and Kinesthetic Learning:

While visual perception is crucial in learning judo techniques, it's essential to emphasize the connection between visual learning and physical execution. The process of translating visual information into physical movement, known as visuo-motor integration, is a critical aspect of mastering judo techniques. Encouraging learners to immediately practice what they've observed can help reinforce the connection between visual input and motor output, leading to more effective learning and retention of complex techniques.

Cultural Aspects:

The role of visual learning through observation and imitation can vary across cultures. In some traditions, particularly in martial arts, learning by watching and imitating is highly valued and may be the primary method of instruction. This cultural aspect can influence how judo is taught and learned in different parts of the world. Instructors should be sensitive to these cultural differences and may need to adjust their teaching methods accordingly when working with diverse groups of students.

Advanced Learning:

As judoka progress from beginners to advanced practitioners, their visual perception and learning processes evolve. Advanced judoka often develop a more refined ability to pick up subtle details and nuances in techniques that beginners might miss. They may also be better at anticipating movements and understanding the underlying principles of techniques rather than just focusing on the superficial aspects. Instructors should be aware of these differences and provide appropriate challenges and insights for learners at different skill levels.

Feedback:

Feedback plays a crucial role in learning complex judo techniques. While visual feedback (such as watching oneself in a mirror or on video) is important, other forms of feedback are equally valuable. Verbal feedback from instructors or peers can help clarify misunderstandings and provide guidance. Tactile feedback, experienced during practice with a partner, helps develop a feel for the correct execution of techniques. Integrating these various forms of feedback can significantly enhance the learning process and help judoka refine their skills more effectively.

Mental Training:

Mental training and visualization are powerful tools in learning and perfecting complex judo techniques. Visualization involves mentally rehearsing techniques, which can activate similar neural pathways to physical practice. This can help reinforce learning, improve technique, and build confidence. Additionally, mental training can include aspects like focus exercises, stress management, and developing a growth mindset. Incorporating mental training alongside physical practice and visual learning can lead to more comprehensive skill development in judo.

From "Picture-Walk" to Riai

Thoughts about kata training by Ulla Loosen and Wolfgang Dax-Romswinkel

Whenever we teach a kata seminar, we try to follow a guiding motto during the sessions. For the USJF kata conference 2024, we have chosen "from picture-walk to riai" as our motto.

What is the problem we want to address?

We observe many kata demonstrations in training, examinations, and competitions. Often, we see "nice" and smooth demonstrations, but we feel that Tori and Uke are merely imitating or copying what they have seen somewhere, lacking understanding of what they should do. They clearly aim to create a "good" visual impression.

What did Kano Jigoro say about visual impression and kata?

In his famous 1889 lecture introducing the concept of Kodokan Judo, Kano stated that many jujutsu kata had lost their value and significance because they mainly focused on improving visual impression. This statement proves that "beautiful vs. practical" is not at all a modern problem. He also clearly stated that any movement not in accordance with natural human movements cannot be judo.

What do we mean by the term "picture-walk"?

As mentioned, many practitioners try to create a visual impression. In doing so, they seem to follow a series or path of imaginary pictures. These pictures are stages of the kata. Practitioners - both Tori and Uke - seem to proceed together from one picture to the next. This is what we mean by calling this phenomenon a "picture-walk".

Are there other terms that describe the same problem?

Yes, sometimes we hear the expression "dead kata", which means almost the same thing.

Why do we prefer the term "picture-walk" over "dead kata"?

"Picture-walk" directly points to the problem itself: some visual memories of practitioners, instructors, examiners, and judges, which are guiding the action. This approach gives us a hook for further research and improvement. "Dead kata", in contrast, is just a statement or description of a problem, without pointing to a solution.

Where do these pictures come from?

A picture says more than a thousand words, and we all use media to study kata. In books, pictures are provided to illustrate the textual description. When looking at the pictures, we better understand the text. Many people look at the pictures first and then read the text. If in doubt, mäny of us rely more on pictures than on text. The more we study, we literally burn them into our brains.

How about live instructions, for example, at seminars?

The question is: what is demonstrated, and what do the learners see? It is part of human nature that visual perception depends on individual expectations (see our paper about visual perception). So if the pictures are already there, the student will observe them in all demonstrations and explanations. Also, if the instructors have these pictures in their minds and memories, they will very likely "produce" them during their demonstrations.

Is there something wrong with the "pictures"?

No, not at all! There are reasons why they appear in books and are explained by instructors. They show ***important results of Tori-Uke interaction***, and if there are significant deviations, something might be definitely wrong.

But where exactly is the problem, if nothing is wrong with the?

The problem is that these stages of the action are a result of attack and responding defense interaction. The problem of "picture-walk" occurs when both Tori and Uke "forget" the interaction and instead try to "walk" from stage to stage or from "picture to picture". This literally "kills" the kata, making it a dead kata. A living kata has the tension of action-reaction.

How can we overcome the problem?

The solution sounds easy: we must simply focus on the process between the pictures, where the interaction of attack and defense happens. To achieve this, we must know exactly the roles of both Tori and Uke and how their actions respond to each other in every stage of the kata.

What is the meaning of "riai" - and what makes a kata a "living kata"?

Riai is a term you often hear in relation to kata. "Ri" translates as "principle" or "theory", "ai" means harmony here. As a compound expression, riai means an execution in "harmony with the principles" or in accordance with the theory. This is all about the principles and theory of

attack and defense. Kata demonstration with "riai" is the opposite of a dead kata - it's a living kata. This core element happens mostly between the pictures.

To sum up: what's the idea of the motto "from picture-walk to riai"?

By trying to look closely at the interaction between the "pictures", we try to avoid "picture-walking" and instead experience the principles of Tori-Uke interaction. We consider this as the key to improving your kata in particular and your judo in general.

Why is this especially important for practitioners in Western countries?

In Western countries, we do not have as many knowledgeable instructors, so we must rely more on media than those who can work with high-level instructors every week or month. This problem was even more pronounced for the first generation of instructors in our countries or regions.

Are there examples of similar problems also in Japan?

We think that the study of Koshiki-no-kata by Daigo-sensei and his group is a very good example of this. Daigo-sensei often regretted in public that he was not motivated enough to study Koshiki-no-kata when Nagaoka-sensei was still alive. Later, Daigo-sensei was responsible for teaching Koshiki-no-kata and chairing the committee, but he felt he did not know enough for this duty. But all other great sensei like Nagaoka, Isogai, Samura, Mifune, Kanemitsu (last menkyo-kaiden in Kito-ryu), Kudo, Otaki, and Kotani had passed away. So he had almost nobody left to ask. He had to rely on media.

What did Daigo-sensei do to solve the problem?

He formed a group of kata specialists which met every week for a period of about 15 years. They collected everything they could find about Kito-ryu and Koshiki-no-kata, tried out everything also in heavy armor, and tried to fill the void as best as possible. Sadly, the results are not published yet, but live on for the moment as part of the knowledge of his students.