

# Exploring characteristics of and transitions between mental states within the Multi-Action Plan model in high-level judo

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## Abstract

The Multi-Action Plan (MAP) model presents an idiosyncratic framework for human performance. MAP research has categorised four Performance Types (PTs; T1–T4) using self-paced activities. Specifically, T1–4 present four distinct mental states experienced by athletes during performance, differing, among other aspects, in the level of effort and perceived control. However, transitions between PTs are yet to be empirically investigated. This study aimed to examine MAP in the hyperdynamic open-skill combat context of judo. We explored how judoka experienced PTs and the transition processes between these mental states. Six British, high-level judoka ( $n = 6$ ;  $Mdn_{age} = 19$ ) were interviewed using a retrospective semi-structured interview schedule. Interpretative phenomenological analysis indicated that judo presents a hyperdynamic difficult-to-predict performance context due to the opponent and fighting rhythm. Second, participants strongly related to T2 and T3 and less to T1 and T4. They also reported experiences 'between' T2 and T3. Lastly, participants reported common transition pathways (e.g., T2–T3), typical transition cues, and specific trainable strategies to optimise performance. Findings are discussed in relation to existing literature. Lastly, we present limitations, applied, and research considerations.

## KEYWORDS

flow state, judo, Multi-Action Plan model, peak performance, self-regulation

## Highlights

- The Multi-Action Plan model presents four distinct mental states experienced by athletes during performance, differing, among other aspects, in the level of effort and perceived control.
- The study findings indicate that judo presents a complex and dynamic performance environment, in which judoka (judo practitioners) mostly experience effortful and controlled mental states.

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- Judoka experience specific transitions and respective self-regulatory processes between mental states during a fight, which can lead to optimal (upregulation) or suboptimal (downregulation) performance.

## 1 | INTRODUCTION

Peak performance is defined as superior functioning resulting in optimal human performance (Jackson & Roberts, 1992). Over the past decades, multiple frameworks and theories have investigated peak (optimal) or non-peak (suboptimal) mental performance states and their antecedents and consequences (Kellermann et al., 2022). One of these, the Multi-Action Plan (MAP) model presents an action-focused, sport-specific, and, importantly, idiosyncratic (individualised) conceptualisation of *both* peak and non-peak states. Introduced by Bortoli et al. (2012), MAP defines four performance types (PTs) on a cognitive (e.g., situational appraisal), emotional (e.g., hedonic tone), and behavioural level (e.g., resource recruitment), underpinned by PT-typical psychophysiological data.

MAP is steeped within the Multi-States (MuSt) Theory for Self-Regulation (Ruiz et al., 2021), which aims to understand and predict idiosyncratic performance and self-regulatory strategies. Further, MAP is underpinned by corroborated and applied findings from the broader peak performance theory and literature, namely, the performance profiling framework Individual Zones of Optimal Functioning (Hanin, 1978); the Mindfulness-Acceptance-Commitment approach in relation to self-regulatory processes (Gardner & Moore, 2004); the Identification-Control-Correction program, aimed at optimising the coaching of elite athletes (Hanin & Hanina, 2009); and, lastly, flow state—a positive but elusive peak experience (Jackson & Csikszentmihalyi, 1999). Consequently, MAP was developed as a multi-dimensional framework, applying tenets of *all* these concepts to categorising PTs and hypothesising transitions between them while aiming to reflect athletes' complex and individual (idiosyncratic) experiences (Bortoli et al., 2012).

### 1.1 | PTs 1–4

Empirically, four PTs have been tested and corroborated in self-paced activities, that is, the performer controls when to perform the task. Specifically, this includes research in shooting and dart throwing (e.g., Bertollo et al., 2016), cycling (e.g., Fronso et al., 2018), and running (Vitali et al., 2019). Additionally, MAP has also been tested in motorsports, that is, driving simulation (Filho et al., 2015). MAP categorises four distinct PTs across two axes: the *quality* of the resulting performance and the level of *effort* a performer exerts to produce it. Specifically, Type 1 (T1) and Type 2 (T2) are characterised by optimal, and Type 3 (T3) and Type 4 (T4) by suboptimal performance. T1 and T4 imply that performance is effortless, even automatic, whereas T2 and T3 are effortful. Specifically, a performer in T1 uses physical and mental resources optimally and experiences

pleasant-functional emotions. Conversely, T2 requires effortful control of resources to, for example, negotiate fatigue. Performers experience functional-unpleasant emotions. However, a performer in T3 overfocuses, experiencing unhelpful cognitions, dysfunctional-unpleasant emotions, and inefficient resource recruitment. Lastly, performers in T4 have generally lost control over their performance. They experience dysfunctional-pleasant emotions (e.g., complacency) and want to withdraw.

### 1.2 | Transitions between PTs

Currently, MAP literature proposes emotion- and action-focused strategies for transitioning between PTs (Bortoli et al., 2012). Action-focused implies that the performer (re)directs attentional focus to core components crucial to effectively executing the task. Contrastingly, emotion-focused strategies are not (yet) closely defined. We propose direction-specific terminology for a more precise description of transitions. Specifically, we will term transitions from a higher- to a lower-numbered PT as upregulations (e.g., T3–T2), and from a lower- to a higher-numbered PT as downregulations (e.g., T1–T2). This also reflects the optimal/suboptimal trajectory of the transition.

In early MAP research, Bortoli et al. (2012) describe the downregulation from T1 to T2 as a switch via action-focused coping. Conversely, performers operationalise emotion-focused upregulation from T2 to T1. Regarding T3, Bortoli et al. (2012) outlined two upregulation pathways: action-focused coping into T2, and more complex emotion-focused coping into T1. Lastly, Bortoli et al. (2012) proposed action-focused upregulation from T4 to T2 and emotion-focused upregulation from T4 to T1. Importantly, Bortoli et al. (2012) emphasise that transitions out of effortful PTs (T2 & T3) could also involve strategies *combining* action- and emotion-focused coping.

However, despite these considered ideas, transitions between PTs are yet to be investigated empirically *within the MAP paradigm* (Kellermann et al., 2022), specifically the timing of when and how transitions occur during a performance and the cues 'triggering' these transition processes (Kellermann et al., 2022). For example, MuSt theory suggests that transitions between mental states occur via a three-dimensional continuum representing different levels of pleasant/unpleasant, functional/dysfunctional, and high/low action monitoring experiences (Ruiz et al., 2021). Complexities become apparent when comparing MuSt's perspective with MAP's terminology of performers sudden 'switching' between PTs (e.g., Bortoli et al., 2012; Robazza et al., 2016). While it is crucial to investigate down- and upregulation processes equitably, we want to emphasise

the importance of training upregulation, coupled with effectively maintaining optimal states, as the core task of sport and performance psychology practitioners. Specifically, as practitioners aim to support athletes in optimising their performance, offering evidence-based and actionable strategies to overall improve and regain optimal performance *during* a performance episode is critical. Therefore, we see both scope and the need to investigate transition processes within the MAP framework, enabling us to offer applied guidance.

### 1.3 | Judo

To date, MAP literature has characterised T1–4 in self-paced activities. PT characteristics in externally paced, open-skill activities are yet to be examined, which could provide important insights as to the extent to which current MAP typology is transferrable to other activities (Kellermann et al., 2022). One such externally paced, open-skill, and hyperdynamic performance context is judo. Judo is a dynamic, physically intense, and mentally demanding martial art. A judo contest involves two judoka (judo players) and typically lasts around 4 min. It consists of several fighting exchanges, performed standing or on the ground. The aim is to score by successfully executing throwing, grappling, or strangling techniques. However, some scores have a higher tariff than others. For example, one method of achieving an ippon, the highest weighted score resulting in an instant win, involves throwing the opponent so they land with their back on the ground.

### 1.4 | The present study

In summary, transition processes between PTs are yet to be investigated within the MAP paradigm. Further, there is an apparent need to examine MAP beyond self-paced activities. Therefore, the purpose of this investigation was to examine the ecological validity of PTs, as currently characterised in the MAP literature, among high-level judoka. Specifically, we addressed two research questions (RQ). First, how do judoka experience MAP's PTs in the hyperdynamic, open-skill combat setting of judo? Second, how do judoka experience the transitions between PTs?

## 2 | MATERIALS AND METHOD

Maintaining MAP's focus on producing idiographic findings, we aimed to offer idiosyncratic (individualised) and *not* generic guidance to judoka or athletes (see Osbeck & Antczak, 2021). Accordingly, we posed RQ relating to our participants *only*. Coherent with MAP literature, we applied an idiographic research lens, producing idiosyncratic findings by intentionally utilising a small number of high-level athletes (e.g., Filho et al., 2015).

In order to offer realistic and evidence-based applied guidance, we adopted a pragmatic approach considering the practical concerns of sport psychologists and their clients (Giacobbi et al., 2005). Specifically,

pragmatism aims to bridge the gap between academic research and applied work by offering an application-driven and flexible paradigm and denying that there is a single truth or reality (Giacobbi et al., 2005). Sport psychology practitioners must critically evaluate recent and relevant evidence to form accurate case conceptualisations and develop coherent intervention strategies (Martindale & Collins, 2013). Therefore, we aimed to offer guidance on idiosyncratic experiences of performance-related mental states and transitions, respecting the complex and dynamic nature of performance.

### 2.1 | Participants

We recruited six British junior judoka ( $Mdn_{age} = 19$ ,  $SD_{age} = 0.84$ ). Two judoka identified as female (P1, P2) and four identified as male (P3–6). Participants represented various competition weight categories (U52, U66, U81, U73 kg). Participants fulfilled McKay et al.'s (2021) criteria to be categorised as 'elite', reporting 6–14 years of national and 3–5 years of international competition experience. Participants were recruited through purposeful sampling, with one of their coaches acting as a gatekeeper for the research team and participants. Prior to participating, the lead researcher provided each participant with an information sheet outlining the purpose and protocol of the study. Participants provided written informed consent prior to data collection. Ethical approval was granted by the University of Edinburgh Ethics Sub-Committee.

### 2.2 | Procedure

This study is the first to investigate MAP in a judo context and, to our knowledge, also the first aiming to investigate peak and non-peak mental states and the transitions between them in-depth among high-level judoka. Due to this exploratory dimension of our research, semi-structured interviews were chosen as an appropriate method to conduct this research study. Interviews were conducted through MS Teams using the lead researcher's university account. The lead researcher interviewed participants using a semi-structured retrospective interview schedule. The rationale behind utilising a retrospective interview schedule was to prompt participants to reflect on past performance experience, both optimal and suboptimal. Interviews lasted between 35 and 75 min ( $Mdn = 49.5$ ) and were recorded for analysis. The schedule was developed in an iterative, collaborative process between the authors, informed by literature and applied considerations. Following several adjustments, the lead researcher conducted a pilot interview with a judoka who did not participate in the study. The pilot participant provided valuable feedback on technical aspects of judo and addressing those accurately in the interview. Specifically, the piloting data allowed the lead researcher to develop better prompts elaborating on the core questions, for example, drawing on the coach or opponent's role, and exploring technical and tactical examples for better effect. The full interview schedule can be made available upon request.

The final schedule consisted of 12 questions across three areas, investigating the first two areas inductively and the third one deductively. Firstly, as a warm-up, the interviewer prompted athletes to reflect upon their general experience and performance-related well-being. These questions also provided context around disruptions caused by COVID-19. Second, the lead researcher asked participants to identify critical elements of their performance. These questions prompted participants to share when they performed well and how they maintained optimal performance. Judoka were also asked to reflect on disruptions and recovery strategies, for example, 'What factors have the potential to disrupt good performance, and why?' Lastly, and switching from an inductive to a deductive approach, the lead researcher introduced participants to the MAP model and the current PT typology. The interviewer asked participants to reflect if they had experienced some or all characteristics and why. Participants were also asked to what extent their experiences could be contextualised within the MAP framework.

## 2.3 | Data analysis

Participant data were analysed using interpretative phenomenological analysis (IPA). We adopted this analysis methodology because it, firstly, allows for idiographic, in-depth within-case analysis. Secondly, expanding towards a thematic cross-case but within-sample orientation, IPA can be utilised to offer ideas on practical implications and some actionable outcomes (Braun & Clarke, 2021). We followed Smith et al.'s (2022) IPA guidelines (Table 1). IPA was conducted by the first author. Subsequently, the second and third authors checked initial notes, experiential statements (ESMs), and personal experiential themes for each interview separately before feeding back to the lead researcher. Minor adjustments were made to ensure that the findings reflected the participants' experiences while highlighting an interpretative layer. Linguistic improvements were made regarding how group experiential themes (GETs) corresponded and related to each research question. This process consisted of meetings and calls involving critical and honest discussions of the analysis processes.

**TABLE 1** Six-step IPA analysis protocol, according to Smith et al.'s (2022) guidelines.

Analysis	Step	Analysis tasks
Within-case analysis, repeated for all six participants	1	Transcribe interview verbatim and read transcript multiple times.
	2	Take detailed experiential notes across three categories systematically, that is, notes on the content of the conversation, linguistic features, and conceptual notes.
	3	Construct experiential statements (ESMs) that directly reflect participants' experiences and attempt to summarise initial notes and early interpretations.
	4	Search for connections across ESMs.
	5	Formulate, consolidate, and organise personal experiential themes (PETs) which act as topic summaries highlighting shared meaning within each case.
Across-case analysis, across all six participants	6	Formulate group experiential themes (GETs) highlighting convergent and divergent features across the sample.

## 2.4 | Trustworthiness

Several measures were taken to increase trustworthiness and maximise transparency and accountability during analysis. First, all judoka agreed to participate in member reflections (Smith & McGannon, 2018). In individual online meetings lasting between 30 and 60 min, the lead researcher provided participants with their data sets and presented the study findings. Subsequently, they gave participants the opportunity to amend, delete, or add information and discuss the findings critically. Minor amendments concerned with correctly interpreting judo techniques and tactics were made. Reiterating that participants 'own' their data, each judoka also received all their documents via email. The lead researcher encouraged participants to contact them within 2 weeks if they wished to make further amendments. None made further changes. Once the write-up was complete, the lead researcher presented an (anonymised) executive summary of the findings to one of their judo coaches. In this meeting, the findings were critically discussed, and the coach supported the study findings.

Further, the lead researcher kept a reflexive diary to record observations throughout the data collection and analysis process (Mays & Pope, 2000). The purpose was to encourage formal and informal reflexivity and become aware of any tendencies impacting how data was interpreted (Hill & Dao, 2021). Lastly, fair dealing was applied to ensure equal consideration of all six participants' contributions (Mays & Pope, 2000). However, we note that we selected the most poignant quotes. Therefore, this final report may not present a precisely equal split of quotes across participants.

## 3 | RESULTS

### 3.1 | RQ1: Judokas' experience of MAP's PTs

#### 3.1.1 | GET 1: Contextual characteristics of judo

##### *Phrasing of a judo contest*

Participants described a typical rhythm between intense physical exchanges and interruptions of the fight, for example, by the referee.

While judoka may start the fight with optimal resources, fatigue levels increase sharply due to effort exertion: 'Whether you're performing well or not, by the fourth minute, you're absolutely dying' [P1].

Participants identified the brief time between exchanges as an important opportunity for in-performance self-regulation such as self-talk to debrief and (re)gain mental composure. Self-talk may be motivational, for example, 'When we go forward again, I've almost backed myself up with a surge of confidence, to go forward with confidence' [P2], or instructional: 'Slight moments of being able to reassess [...] recalibrate [...] in relation to that particular person's stance' [P1].

#### *The role of the coach*

Participants emphasised three characteristics of a shared mental model with their coach to optimise performance. First, P1 described their bond with the coach as an 'internal bubble' [P1] during the performance and that '[he] helps me regain that focus back, because sometimes you get a bit too much into the fight and you're not thinking at all' [P1]. Second, athletes triangulate coach feedback with their in situ planning: 'You have to get focused about the next exchange and [...] fit all of that around what your coach is trying to scream' [P6]. Lastly, coaches help identify down-regulation: 'You'd hope that you have a coach that realises that [downregulation] too [...] You're not going to realise it until it's too late' [P3].

### 3.1.2 | GET 2: PT characteristics in judo

Judoka highlighted the complexity of PT categorisation due to idiosyncratic perception and fighting style differences (Table 2). Participants identified that they spent the most time in T2 and T3. Indeed, most participants found it difficult to clearly distinguish between T2

and T3, while T1 and T4 seemed comparatively distinct. P1 summarised: 'I think the lines between a lot of these things [T2 and T3] are usually quite blurry [PTs] are on a spectrum'. They also described that PTs' physical and mental characteristics may result in different typologies: 'Even if your mindset stays in that T1 state all the way through, you can still be in a T4 lack of resources'.

#### *Performance type 1*

Five participants expressed experiencing T1 rarely. Participants identified T1 as not too relevant, realistic, or even desirable in judo, considering the high task demands. P3 highlighted that PT experience may be linked to fight dynamics and idiosyncratic fighting style: 'I think the people that usually win by T1, when they lose, it's by T4'. All participants agreed that T1 occurs most likely at the beginning of a fight while resources tend to be available. Overall, the appraisal as a flow-like experience seems to take place post-performance: 'If I've got the [optimal] focus, then I'm not thinking during the fight, like I'm just doing it'. [P1].

#### *Performance type 2 and 3*

T2 resonated the most with participants. Participants identified T2 even as the most rewarding PT because they would successfully negotiate adversity during the fight. P5 compared T1 and T2:

Type 1, it's not as rewarding, although it's probably the perfect fight. But it's definitely not as rewarding. Whereas Type 2, you can experience things going wrong, but you can come out of it better. So, I'd say it's more rewarding to be in Type 2.

However, participants emphasised that more nuance is needed regarding categorising T2 as functional but unpleasant. Some argued

**TABLE 2** Selection of T1–T4 characteristics, as illustrated by participant quotes.

PT	Characteristic	Raw data participant quote
T1	Task monitoring	'If you're minimally conscious in judo, you're not gonna get much done. [...] in type 1, it seems that you're laid back too much' [P6]
	Time spent in T1	'I'd always wanna be spending time in type 1, just always feeling on top of the game but that's unrealistic'. [P4]
	Resources	'You don't spend very long in when you have optimal resources, like 30 s or something, and after that you're gonna be out of breath, you're starting to feel tired, you're in type 2'. [P1]
T2	Pleasant	'I definitely wouldn't say, just because you're being openly effortful, or openly physical, I wouldn't say that is an unpleasant feeling'. [P6]
	Unpleasant	'Most of the time, competing, it's not gonna be that pleasant'. [P1]
	Dominance	'You're feeling ahead of your opponent'. [P4]
T3	Unpleasant	'When you're feeling that lack of resources, that lack of energy, maybe especially in judo, [...] it's very unpleasant'. [P1]
	Overthinking	'[I would] land in type 3, where I'm conscious, I'm aware, and my focus is too much'. [P6]
T4	Self-efficacy	There's a certain level of confidence in me where I know I will do anything to get off a throw. [...] I won't just give up and go 'fine! launch me!' [P6]

that *because of* how hard they must work to maintain T2, operationalising T2 may, in fact, be pleasant to them. For example, this can be reflected in perceiving to dominate the opponent.

Regarding T3, participants reported three common characteristics of T3. First, they identified T3 as consciously unpleasant due to high levels of fatigue. Second, participants reported a tendency to overthink after acute down-regulation, in most cases from T2, for example, '[I'm] probably trying too hard' [P5]. Lastly, T3 occurs in most cases unpredictably: 'I feel that you never anticipate for a T3 unless you know the player' [P6].

#### Experiences 'between' T1-T3

Participants agreed that they spend the most time in T2 and T3 during judo fights. Also, they identified that T2 and T3 overlapped the most, with some experiences falling 'in-between' T2 and T3. For example, P1 stated: 'The difference between being pleasant and unpleasant and functional and dysfunctional, effortful or not, they're not always that clear'. Further, P5 developed a 'positive' and 'negative' T3; a 'negative' T3 entails effortful but unsuccessful attempts to upregulate to T2, accompanied by unpleasant emotions and intense fatigue. In contrast, a 'positive' T3 entails some effortful successful

first steps towards upregulation and, therefore, more positive emotions, with effort levels remaining high.

#### Performance type 4

All participants agreed that T4 occurs very rarely in competitions. Most participants disagreed with MAP's current notion that T4 involves pleasant emotions and action withdrawal. Instead, they described proactive overexertion of effort towards the end of a fight when judoka experience negative emotions due to extreme fatigue. P1 explains: 'You're not withdrawing from it, it's almost like a total Hail Mary moment'.

### 3.2 | RQ2: Judokas' experience of transitions between PTs

Participants unanimously identified that transitions between PTs occur in every fight unless an early ippon (a bout's ending score) is scored. P1 explains: 'It's not possible, in my opinion, to have [...] a performance which doesn't cross the states'. Participants identified several transition characteristics (Table 3).

**TABLE 3** Up- and downregulation processes, as illustrated by participant quotes.

Downregulation (concept & participant quote)	Upregulation (concept & participant quote)
Cues for downregulation & strategies for upregulation	
Self-doubt: 'It's very predictable to me that when I am in a position where I'm maybe losing exchanges, that I will start to have doubts about own performance [which disrupt my performance]'. [P1]	Internal debrief: 'I need to remind myself of what I need to do in-between exchanges'. [P3]
Opponent: 'If there's a thing that an opponent does that you just don't like [...], you could go from type 2 to type 3 in a heartbeat'. [P6]	Motivation: 'It's okay you got a penalty, but you can't win on penalties. So, just throw them. Beat them on judo'. [P2]
Tactics: 'If people are going to fight for penalties [...] that frustrates me and [...] it's not an interesting fight for me'. [P3]	Dominance: 'If I'm maybe down a score or maybe struggling physically, [...] I try and tell myself, 'get up first, get up first''. [P5]
	Own strengths: 'You can say 'I'm good at newaza, I can switch it and make it a good exchange by doing newaza''. [P6]
Results:	Results & maintaining an optimal PT:
Self-talk: 'I'm gonna lose.' [...] when that conversation starts with yourself in your head, that's not good'. [P1]	Positive self-talk: 'You are one step ahead them [...]. 'Ah I've thrown him. I Can do it again. [...] this is mine''. [P4]
Strategy: 'It totally changes from trying to really beat your opponent to 'oKay, I need to try and not lose here''. [P3]	Motivation: 'Maybe a bit of relief, but obviously it's fuelling'. [P3]
	Self-efficacy: 'Everything kind of went right. [...] I still feel like I've got an air of confidence'. [P2]
Next steps:	
Tactics: 'It's [downregulation] a hard thing to try and come back from, especially with judo because it can easily take a turn'. [P5]	
Time: 'You're just running down the clock, trying to grind it out, trying to get a win.' [P3]	
Level of control: 'I think because you can't control often whether there's a disruption [...], it's more like treating the symptoms of the disruption, rather than trying to stop disruptions'. [P1]	



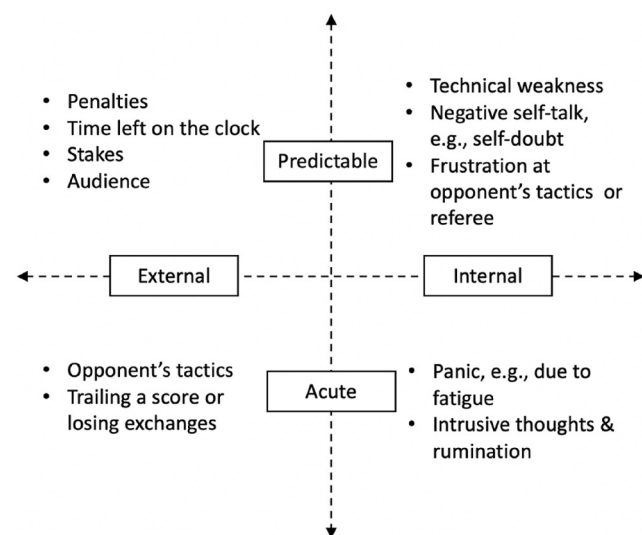
### 3.2.1 | GET 3: Cues and results of downregulation

#### *Cues of downregulation*

Participants identified downregulation cues across two axes: Internal versus external cues and predictable versus acute cues (Figure 1). There was a notable tendency among participants to use passive phrases to describe catastrophic (i.e., acute and uncontrollable) downregulation, for example, 'land in T3' [P1], 'I feel myself slipping [into T3]' [P2]. Participants articulated several separate and interacting downregulation cues, for example, frustrations around (external) tactics and interruptions and (internal) negative self-talk. For example, P5 and P4 considered that losing exchanges or trailing a score leads to a perceived need to change tactics due to penalties or time left on the clock: 'I basically got to be more careful in what I'm doing.' [P5]; 'You're not fighting how you like, because you're not fighting naturally [...] It's a distraction' [P4]. Further, recognising the tactical behaviour of their opponent may lead to downregulation, as P1 described: 'This person has worked me out and I don't know what to do'.

#### *Results of downregulation*

Participants recognised downregulation through self-talk, such as self-doubt or experiencing catastrophic thoughts, or to signal changes in strategy. Participants also mentioned other cognitive concomitants, for example, perceiving a sense of acceptance (overly) focusing on task-irrelevant elements, and losing the ability to read the opponent's body language. While all participants agreed that recovery from downregulation to a suboptimal PT is possible, most suggested that, in a competition setting, upregulation is very effortful and dynamic. P3 described that, for them, recovery from T3 is unlikely: 'Once I'm in T3, there's [...] no coming back from it'.



**FIGURE 1** Cues for downregulation, as described by study participants. This figure provides an overview over common cues for downregulation from a more optimal (Type 1 & Type 2) to a suboptimal (Type 3 & Type 4) mental state.

Participants agreed that preventing downregulation is a tactically less risky and deliberate strategy: 'Some of them [strategies] would be prevention if I feel like, if I feel myself slipping' [P2]. However, they also agreed that downregulation, to an extent, is inevitable.

### 3.2.2 | GET 4: Cues, strategies, and results of upregulation

#### *Cues and upregulation strategies*

Participants reported that the purpose of upregulating is to regain control over the fight and their internal state. Participants described the transition from T3 to T2 as their most common upregulation pathway. They chose very proactive language to describe their upregulation strategies, for example, 'switch into T2' [P2], 'snap into T2' [P6], or 'picking yourself back up out of T3 into T2 and T1' [P4].

Participants identified self-talk mostly in-between exchanges as their main self-regulation strategy to (re)attain an optimal PT. They characterised five specific self-talk strategies: First, organise thoughts and emotions for an internal debrief; second, to set specific strategic intentions for the upcoming exchange; third, to make sense of why downregulation occurred in the first place and muster motivation; fourth, triangulate own debrief with coach feedback; and fifth, to demonstrate dominance. Further, some participants identified tactical strategies resulting in upregulation. They described that adopting tactics by gradually regaining optimal grips would help in utilising technical strengths and, as a result, lead to better performance.

#### *Results of upregulation and maintaining an optimal PT*

Participants agreed that it was easier to recognise when upregulation *did not* work than when it did. However, they identified positive self-talk, recognising tactical success, regaining motivation, and increased self-efficacy as crucial indicators for successful upregulation. Lastly, participants reported four common strategies for maintaining optimal performance (T1 and T2). First, to have a clear, idiosyncratic understanding of how to make the best use of breaks between exchanges mentally; second, to fight proactively by creating opportunities that match one's technical strengths, for example, 'I do my best when I'm being aggressive and I'm the one making first moves, that's how I do judo' [P3]; third, to trust in one's preparation and fight strategy; and lastly, to deliberately maintain a PT instead of attempting to upregulate.

## 4 | DISCUSSION

The purpose of this study was to examine the ecological validity of PTs, as currently characterised in the MAP literature, among high-level junior judoka. To our knowledge, this is the first study to investigate MAP's peak and non-peak mental states and between-states transitions in an externally paced, open-skill, hyperdynamic environment. IPA analysis was conducted on participant interviews,

addressing two RQ. Corresponding findings will be discussed in the following section.

## 4.1 | Research question 1: Investigating the MAP typology in judo

### 4.1.1 | A hyperdynamic, open-skill combat context

Unsurprisingly, participants identified their opponent as the centre of their hyperdynamic combat environment. First, they reported that interpreting and predicting the opponents' tactical and technical behaviour presented a high mental processing load. This finding is consistent with previous research, demonstrating that anticipating their opponent's actions was a crucial skill among successful international judoka (Piras et al., 2014). Given the age and stage of the participating judoka, this skill presents an important discriminant factor as part of their preparation for (even more) high-level contests.

Second, participants emphasised that their opponents' fighting style depended on idiosyncratic technical strengths, tactics, and coaching. Specifically, tactical demands vary between weight categories (Miarka et al., 2016). Corroborating participants' experiences, judoka respond to their opponent with their preferred throwing techniques (Courel et al., 2014). Furthermore, participants adapted tactics and selected techniques depending on who led the exchange. Research endorses their insights, highlighting gripping patterns as particularly crucial (Calmet et al., 2010).

In summary, judoka operate in a hyperdynamic performance environment, which presents them with high-level physical and psychological demands that are often difficult to predict. Judoka are required to process, interpret, and anticipate their opposition while regulating themselves within this complex performance setting. Given that MAP research so far has utilised activities performed by one athlete, the results of our study present novel findings in relation to dynamic and difficult-to-predict psycho-social cues presented by their opponent, affecting judokas' performance and the mental demands associated.

### 4.1.2 | T2 and T3

Participants strongly related to T2 and T3. Some reports reflected T2's current characterisation (Robazza et al., 2016). Extending this, participants reported experiences 'between' T1–T3, for example, overlap between T2 and T3 during successful upregulation from T3 to T2. Further, in T2, judoka reported experiencing rewarding emotions, perceived control over the opponent, and high self-efficacy. Reflecting such overlap between T1 and T2, we will call this state T1.5 hereafter. T1.5 reflects that higher levels of effort are associated with greater perceived reward (Wang et al., 2017). Conversely, this could also be tentative evidence contributing towards the 'demystification' of flow state. For example, Harris et al. (2017)

investigated perceived and objective effort measures in relation to gaze behaviours in matched-to-skills tasks. Findings challenged the currently dominant understanding of flow state being characterised by the absence of effort. Instead, findings offered evidence that flow states are underpinned by optimally calibrated effort and superior attention control (Harris et al., 2017).

A further concept that could help contextualise T1.5 is clutch performance. Defined as episodes of superior performance in high-pressure contexts (Schweickle et al., 2020), clutch performance is characterised by aspects including deliberate focus, increased awareness, and automatic performance. We would like to direct readers interested in more details to Kellermann et al. (2022), who provided an overview of commonalities and differences between T1, T2, clutch, and flow. Notably, T1.5 shares pleasant-functional emotions with T1 and flow state; however, it lacks automatic movement execution typical of flow states (Swann et al., 2012). Further, participants did report T1.5 (and T2) as effortful experiences requiring awareness and deliberate task focus—two characteristics their experiences share with clutch performance (Schweickle et al., 2020).

### 4.1.3 | T1 and T4

Participants rarely experienced T1's current characteristics (e.g., Bortoli et al., 2012). Specifically, minimally conscious task monitoring and optimal resources reflected little ecological validity in judo due to its hyperdynamic and hyperphysical, fatigue-inducing nature. Losing conscious control may lead to rapidly emerging crucial opportunities for the opponent to score.

Regarding T4, participants disagreed with MAP's notion of action withdrawal (Bortoli et al., 2012). They described a fatigue-induced, unpleasant burst of remaining resources deployed to defeat their opponent towards the end of a contest. Bortoli et al. (2012) characterised T3 with ineffective recruitment and utilisation of physical and mental resources. In contrast, performers in T4 experience a complete lack of resources while feeling complacent and low in energy (Bortoli et al., 2012). Therefore, despite our participants categorising such uncoordinated overexertion of effort as T4, it resembles T3 rather than T4 if strictly abiding by the current PT categorisation (Bortoli et al., 2012). Additionally, considering the self-presentation of participants, T4 may be hard to admit to explicitly and covertly. However, mentally 'checking out' may come at a high physical (i.e., injury) and mental cost (e.g., motivation) during a high-intensity and demanding judo fight.

## 4.2 | Research question 2: Transitions between PTs

### 4.2.1 | Transition cues

Participants identified emotions as downregulation cues (e.g., frustration) and as indicators marking effective upregulation (e.g., relief).



This process is consistent with evidence from the wider literature. For example, Affect as Information Theory presents emotions as meta-cognitive cues for transitions between distinct cognitive processing styles (Shiota et al., 2021). Reflecting this, participants reported downregulating from effective (T2) to ineffective cognitive resource management (T3) due to frustration. Moreover, they deemed the opposition's tactics an additional downregulation cue. Considering this aspect from a training and coaching perspective, strengthening judokas' abilities to anticipate their opponents' actions could help prevent them from downregulating into less optimal or even more suboptimal mental states due to their opponent's tactics. Existing research studies corroborate this, suggesting that focusing on the lapel and face improved judokas' anticipation of their opposition and, in turn, enhanced their overall performance (Piras et al., 2014).

In contrast, during upregulation opportunities, participants identified a notable shift from unpleasant to pleasant emotions. They reported that such momentum increased self-efficacy during and after upregulation. Previous research demonstrated that self-efficacy strengthens optimal performance (and exacerbates suboptimal performance) (Shaw et al., 1992). Similarly, recent evidence found increased confidence to precede peak mental states (Boudreau et al., 2022). In conclusion, while existing literature suggests self-efficacy might be a precursor to enhanced performance, our findings also provide tentative evidence for self-efficacy to play a role as a consequence of successful transition processes between PTs.

#### 4.2.2 | Transition strategies

In this study, we investigated both up- and downregulation strategies. However, we placed greater emphasis on upregulation, considering our previously stated aim of offering applied guidance on how it and the maintenance of optimal PTs could be trained. Currently, MAP literature hypothesises action- and emotion-focused coping strategies for transitions between PTs. Bortoli et al. (2012) defined action-focused strategies as the deliberate focus on core task components. Participating judoka corroborated this approach by focusing on their opponent's behaviour. For example, participants highlighted deliberate switching to their idiosyncratic technical strength—a common strategy among elite judoka (Courel et al., 2014). A second dimension of action-focused upregulation was the importance of appearing dominant towards their opponent, often reflected in instructional or motivational self-talk. However, no patterns could be detected yet regarding what types of self-talk judoka use for specific transitions (see Latinjak et al., 2019).

Overall, judoka described downregulation as an involuntary but inevitable process. In contrast, they articulate very deliberate active upregulation strategies. This indicates their level of agency in upregulation—a pertinent consideration for practitioners when forming a case conceptualisation.

#### 4.2.3 | Transition pathways and processes

Lastly, judoka described linear transition pathways, for example, T1–T2 or T3–T2. This presents, in part, a contrast to current MAP literature. For example, Bortoli et al. (2012) proposed transition pathways that skip PTs, for examples, T3–T1 or T4–T1. The current study also provides tentative evidence that at least some transition processes might operate on a continuum rather than as catastrophic (i.e., sudden) 'switching'. Specifically, participants identified states between T1 and T2 and variations of T2 and T3, suggesting that some but not all characteristics of PTs might apply under certain circumstances. These findings are supported by Ruiz et al. (2021), proposing that transitions occur on a continuum. For example, participants described T1 as a difficult-to-attain and even unrealistic state in judo that may only occur at the start of a contest while physical and mental resources are readily available. This implies that once judoka exit T1, re-entering T1 is unlikely. In contrast, they described transitions into (and out of) T2 with more facets, for example, T1.5, or states between T2 and T3, making T2 a more realistic and rewarding experience.

#### 4.3 | Limitations

Idiographic research intends not to offer generalisable ideas; therefore, the small number of 'just' six participants will not be considered a limitation. However, this does not mean the current study is without potential issues. First, participants shared their experiences in retrospect, referring to general experiences and specific examples. A valuable first step in importing MAP into judo, it may, however, lack specificity and nuance. Given that MAP investigates performance idiosyncratically (Bortoli et al., 2012), a stronger focus on specific events would have strengthened our study. Second, we are aware of social desirability issues around participants preferring optimal over suboptimal PTs, particularly T4. However, our impression was of engaging in honest and transparent conversations with elite performers. Lastly, given that interviews were conducted shortly after severe disruptions due to COVID-19 affecting training and competitions, it might have been difficult for participants to recall undisturbed pre-COVID-19 performances. Considering their age, the pandemic happened at a crucial time, affecting competition and training opportunities considerably.

#### 4.4 | Directions for future research

This study is the first to examine MAP in judo. More research is needed to investigate MAP's ecological validity in such hyperdynamic settings. Specifically, characteristics such as difficult to predict, rapid changes in momentum, as well as high physical and mental demands on the athlete can also be recognised in other high-performance sports settings. Therefore, aside from domain-specific suggestions,

we will offer general directions for future research. Reflecting current PT categorisation, research is needed to substantiate our tentative claims regarding transition processes, cues, and pathways. Specifically, what are typical up- and downregulation pathways? Are transitions linear (e.g., T2–T3), as this study would suggest, or can states be skipped (e.g., T3–T1), as early MAP research proposed (Bortoli et al. (2012)? Are pathways consistent across performances? Research is also needed to build on findings from this study reporting some transitions on a continuum, that is, between T2 and T3. Such investigations would also help inform MAP's relationship to the MuSt theory (Ruiz et al., 2021).

Methodologically, we utilised post-hoc retrospective interviews to conceptualise MAP in judo. Given apparent limitations, research studies should consider alternative approaches such as investigating such transitions during fights in situ, for example, using event-specific stimulated recall, or real-time data capture, for example, utilising a think-aloud protocol. Lastly, future research studies should also explore psychophysiological concomitants of transitions. Given MAP's in-depth PT characterisation on a psychophysiological and neural level, a similar depth of investigation is needed regarding transitions.

#### 4.5 | Applied considerations

Practitioners may reflect on the complexities of athletes not 'fitting' one PT. For example, our participants articulated several issues around stringent categorisation—understandable considering the complexity of human performance. Further, we make tentative claims about the 'trainability' of transition processes. Participants reported substantial agency in initiating and conducting upregulations. While research is needed to illustrate this, we propose that coaches train and encourage athletes to notice downregulation cues and actively use upregulation strategies where appropriate.

#### 4.6 | Conclusion

We conclude that T1–4 require refinement when contextualised in an open-skill, hyperdynamic performance context such as judo. Athletes may experience (currently) undefined, idiosyncratic mental states involving some characteristics from T1 to T3. Extending MAP to date, we offer first evidence that athletes experience several PTs per performance event, coupled with up- and downregulations between PTs. Future research should investigate the occurrence of and transitions between PTs.

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#### CONFLICT OF INTEREST STATEMENT

The authors report there are no competing interests to declare.

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