Chapter 6
Flow in Creativity: A Review of Potential Theoretical Conflict

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Abstract This chapter reviews both qualitative and experimental research, arguing that some theories surrounding flow are potentially contradictory to theories of creativity. Dual-process thought systems and hypofrontality theories are discussed in relation to creativity and flow, highlighting omissions in research to date, and the need for further empirical investigation of creativity in flow. Four specific areas for future research are proposed: (1) a more in-depth understanding of self-evaluative mechanisms during flow, and the relevance of clear goals and feedback within creative domains; (2) whether flow during deliberate forms of creativity is possible and whether this contradicts hypofrontality theories; (3) the complex relationship between creativity, affect, and flow; and (4) whether and how flow relates to creative achievement.

6.1 Introduction

Csíkszentmihályi reports that the first inklings of flow theory came to him while he was a graduate student, studying creativity in the visual arts (Nakamura and Csíkszentmihályi 2005). While observing artists hard at work, he noted that they worked feverishly on artworks that, when finished, were often abandoned and then never thought of again. This led him to wonder what it might be about the subjective experience of creating, rather than the external rewards – e.g., fame and fortune from selling a finished product – that drove artists to create. This question and his initial qualitative work triggered the discovery of flow, which has now become a cornerstone concept in the field of motivation psychology (Csíkszentmihályi et al. 2005; Deci and Ryan 1985; Eccles and Wigfield 2002). Flow and creativity have therefore been closely intertwined from the very beginning. Since creativity is arguably the force behind all human progress, and flow is a significant force driving creativity, this close relationship makes the study of creative flow especially

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important. Nonetheless, of all the activities that can potentially inspire flow, the creative domain remains relatively underexplored.

Since the traditional nine components of flow experience (e.g., skill-challenge balance, effortless sense of control, clear goals and feedback: see Csíkszentmihályi 2002) seem to be reported universally in qualitative studies of people engaged in a variety of activities (Massimini et al. 1988), it has been largely assumed that flow differs little between activities in terms of prerequisites, consequences, or correlates. However, there are some suggestions to the contrary (Delle Fave et al. 2011) as well as noticeable gaps in flow research that need to be addressed before such a universality of the theory can truly be confirmed. Additionally, studying the unique factors that contribute to flow development during creativity can provide new layers of information about both flow and creativity, separately and together.

The majority of flow research to date has focused on regimented activities, ones which can become automated with practice, where performance can be monitored and controlled easily, and which therefore have clear goals and standards of success. Of all the components of flow, clarity of goals and unambiguous feedback have received the least critical attention from researchers, perhaps in part because they are straightforward aspects in these more frequently studied, systematic activities.

Flow research has been particularly strong in the domain of athletics (Engeser and Schiepe-Tiska 2012; Jackson and Csíkszentmihályi 1999; Jackson and Kimiecik 2008; Jackson et al. 2001), where the colloquial phrase 'in the zone' has long been used synonymously for flow, with perhaps more emphasis on peak performance in addition to the subjective flow experience (Murphy 1996; Young and Pain 1999). Video and computer games are most frequently used to examine flow experimentally (Chen 2007; Rheinberg and Vollmeyer 2003; Sweetser and Wyeth 2005), as the task difficulty can be easily controlled and manipulated and these games are therefore an ideal experimental tool for following the learning curve of ever-increasing skill with practice in relation to increasing task demands.

However, there are potentially important differences between creative activities and those mentioned above, on which the majority of flow theory has been founded: i.e., the act of creating can never be learned to the point of rote automaticity, since it depends – by definition – on the creation of something novel each time, and the careful assessment of that novelty. The standards by which creative actions are judged are also inherently much more ambiguous and complex than they often are in other domains (Csíkszentmihályi 1996; Simonton 2000), and creative activity requires a good deal of conscious cognitive processing (Allen and Thomas 2011), which is to an extent at odds with theories that suggest flow is mainly experienced during unconscious/automated processing of highly practiced actions (e.g., Dietrich 2004a).

This chapter will argue that more research is required specifically on flow within creative activity, and particularly using more experimental methods. Previous work on flow during creativity and the methodologies utilised thus far are reviewed, and four possible areas for future research are proposed: (1) the clear goals/unambiguous feedback components of flow; (2) the feeling of effortless automaticity and control during flow in relation to hypofrontality theory (Dietrich 2004a) and dual-process

systems of creative thought (Allen and Thomas 2011); (3) links between creativity, flow, and affect; and (4) whether/how flow relates to creative performance.

6.2 Methods Used in Previous Research

Although artists may have been the original inspiration for flow, and the subject of several qualitative studies, there has been a lack of experimental research focusing on flow in creative activities. In some ways this is surprising, given that it was artists who inspired the theory and therefore seem to be prime subjects for the study of flow. On the other hand, it is perhaps unsurprising, as both flow and creativity are concepts that have been notoriously difficult to quantify and define (Moneta 2012; Mumford 2003); it is possible that, when tackled together, they have so far been considered scientifically unmanageable.

There have been numerous qualitative studies on flow in relation to creativity, using interview techniques. Csíkszentmihályi (1975, 1996) interviewed artists, musicians, and other creators (e.g., scientists) to explore creativity in relation to the known components of flow previously proposed, where he acknowledged that some components, including feedback, were more complex in creative domains. Reynolds and Prior (2006) explored how flow could benefit women suffering from cancer, finding it helped to reduce stress by reducing intrusive thoughts about illness. They also noted that clear goals did not seem to feature very highly in the accounts of the women while creating. Similarly, Chilton (2013) reviewed the relevance of flow to art therapy practice. Banfield and Burgess (2013) investigated the importance of embodiment in creative flow development, focusing on haptic input from the chosen medium (2D and 3D media artists) and how this influences engagement, a rare re-examination of the components that contribute to flow during creativity.

However, these were all qualitative case studies which, while rich in phenomenological detail, come with the usual caveats associated with qualitative data, e.g., that they have been interpreted subjectively, are based on anecdotal recall abilities temporally removed from the phenomenon they are reporting, and lack generalisability. Therefore more experimental work is needed, for the sake of rigorous control of extraneous influences, to examine the flow experience directly after it happens, and to determine factors that can be manipulated to show measurable effects on flow. When the arts are examined experimentally, it tends to be in the context of musical performance (Bakker 2005; de Manzano et al. 2010) or other *performing* arts (Gruzelier et al. 2010). The emphasis has therefore been on actions that are (like athletics and video games) learned, highly practiced, and which are then more or less automatically executed, rather than novelty-producing actions. This has left the flow of conscious thought and cognitive processes like creativity disproportionately unexplored.

The only experimental studies found to date on flow during specifically creative actions (visual synthesis: Cseh et al. 2015a; or group musical composition: MacDonald et al. 2006), found mixed results about the link between creator flow

and its relationship to creative performance. In a novel adaptation of the task, Cseh et al. used the *creative mental synthesis task* (originally designed to explore mental imagery in creativity: Finke and Slayton 1988) to experimentally simulate the creative visual design process using non-artist participants, and measuring flow post-task using the Flow State Scale (Jackson et al. 2010), alongside pre-post-task mood measures and performance ratings. The synthesis task involves presenting participants with sets of simple geometric and alphanumeric shapes (e.g., circle, triangle, X, J, 8), then asking them to combine these symbols into a new, recognizable composite picture of an object or scene. This study was designed to determine whether experiencing flow during a simple creative task would be associated with a positive change in affect, and whether flow was associated with both self-perceived and external measures of performance. Findings showed that experiencing creative flow was related to an improvement in affect (increased positive/decreased negative) over the course of the creative task, and to self-perceived performance, but not to externally rated subjective and objective measures of performance.

In MacDonald et al. (2006), on the other hand, groups of music students were tasked with composing pieces of music. Mean group flow measures were taken using a form of the Experience Sampling Form (ESF: Csíkszentmihályi and Csíkszentmihályi 1988), to determine if higher group flow during composition could be linked to better performance reviews of compositions by various levels of instructors. They found a link between group flow and superior creative performance as rated by postgraduate tutors, but not with ratings by senior lecturers.

These experimental findings, therefore, show equivocal links between flow and objective or externally rated creative performance. No other experimental work was found specifically in relation to novelty-producing actions and flow. This shows an area of flow research which has been underexplored to date. The two existing experimental studies also suggest some specific methods for future research on flow in at least visual and musical creativity, and with individual creators vs. groups.

6.3 Discussion: Theoretical Conflicts and Future Research

The scant experimental work on creative flow has so far focused on the links between experiencing flow and level of creative performance achieved. Qualitative research has mainly been used to explore the subjective experience of creating and flow, and how this may help in clinical settings. Qualitative methods are indeed most suited for exploring an individual creator's phenomenology, especially in the case of flow, which is a highly personal, subjective phenomenon. However, not much work has been done to re-examine the theories and assumptions surrounding creative flow, such as the unique components that may help facilitate flow during creativity specifically, its neural underpinnings, and its consequences in terms of affect and performance outcomes. This section highlights some theoretical conflicts between flow theories and theories of creativity, as well as factors which remain unknown, and which require closer scrutiny in future research.

6.3.1 Clear Goals and Unambiguous Feedback Components

"Coherent, non-contradictory demands for action and clear, unambiguous feedback" (Csíkszentmihályi 1975, p. 46) are considered essential components for flow development, the assumption being that in order to attain the skill-demand balance that is thought to lead to flow, one needs to be monitoring one's own skill and be certain that it is adequate to handle the challenges of the task to achieve an identified goal through a clear action plan. This is a reasonable, theory-based assumption and an uncomplicated issue when standards of success in an activity are clear-cut. For example, the athlete knows she has been successful when she wins a game with specific rules, or crosses a finish line before her competitors. The video game player knows he is doing well when he manages to 'level up' in a game after shooting a requisite number of targets. The flute player knows she is hitting all the correct notes of a highly practiced piece of music because she does not hear a jarring note. Feedback and goals are clear in all these examples, because judgment is based on objective criteria. But even researchers who have made the study of creativity their life's work have been struggling to find a conclusive definition of what should be considered creative and what is not (Mumford 2003), and how best to assess creativity. In other words, how does a painter, a writer, a composer know while they are creating that their idea or the final product are of a high quality when judgment of creativity is subjective and changeable?

Csíkszentmihályi (1996) acknowledged that the issue of feedback is not as straightforward for creators as it is in other domains because there is a shared social aspect to the judgment of creative work, which often operates on a lengthy timescale between creation and dissemination. The creative arts hinge on a dialogue between an individual creator, cognitive and material processes, a product, and an audience in a wider social context (Glăveanu 2013). Whether a work is considered creative or not by either creators themselves or their peer community is a complicated, subjective, and imprecise matter. The ultimate judgment of how creative a work is deemed to be can take a long time and depend on who is evaluating it, and when and where, and is still open to personal opinions. Because the experience of flow theoretically depends on having clear, immediate feedback, Csíkszentmihályi argued that creators deal with this ambiguity of feedback by "internalizing the field's criteria of judgment to the extent that they can give feedback to themselves, without having to wait to hear from experts" (1996; p. 116), which they learn to do through experience; i.e., they learn to encode a prediction system based on previous experiences and observations, intuitively knowing which factors the audience will respond to well and which they will not. This is what provides them with the instant and clear self-feedback to facilitate flow. However, Simonton (1988) argued that many artists – even famous and experienced masters such as Beethoven – were not always good predictors of which of their works would be popular with their audience (i.e., their 'field').

Simonton (2000) also disputed that this sort of predictive expertise in the creative arts can ever be learned. First, unlike other fields where the principles of a

first success can add to and build onto the next success, this is untrue of creative endeavours, where the next creative endeavour in fact benefits from being different to the preceding success, due to novelty being a defining factor of creativity. Secondly, artworks are often very complex and the judgment of their merit is based on a wide variety of factors – e.g., in the visual arts: colour, composition, style, subject matter, historical influences, personal preferences, emotional tone – that it is impossible for anyone, no matter their experience, to be able to make a 100 % correct assessment of all the necessary factors involved to predict how an audience will respond to all of them.

These are not factors with which most athletes, for instance, have to contend, at least not to the same degree. The success or failure of one performance can inform and build toward the outcome of the next, as novelty is not often the end goal in athletic growth, but rather improvement of previous speed, strength, etc. In other words, athletes' successes are progressive, while creators' are self-contained to each individual performance. As athletes also have clear goals to work towards, self-perceptions and external, objective success judgments mesh easily. Therefore it is easy to see why flow is often confused with objective peak performance, though this is not always true (Landhäußer and Keller 2012): all that theoretically matters to flow development is the athlete's own perception, and this will likely match objective reality as there is little room for error or bias. This is not necessarily the case for creators.

Since flow only theoretically depends on perceived skill and demand, it could be argued that for flow to develop, it does not matter whether a creator has an objectively accurate assessment of their skill, only that they are pleased with and certain of the progress of their work, even if that assessment is skewed in some way. However, the theory that goals and feedback need only be based on personally-defined criteria assumes that creators are always able to give themselves unambiguous feedback about how well they are attaining at least their own personal goals, and that they never end up misleading or surprising themselves. However, anecdotal accounts by historical creative masters (e.g., see Beveridge 1957; Ghiselin 1952; Koestler 1964) frequently show a mixed sense of certainty during the self-evaluation phases of the creative process. There are many instances of creators noting that there can be a disconnect between initial ideas and their practical application or execution, which can lead to a high skill rating in one stage (e.g., when they have their initial idea) and a low one in another (e.g., when they execute that idea), illustrating the ambiguity inherent in self-monitoring of skill within the continuum of the creative process. This means that there are potentially cognitive faults or limitations in the self-feedback system, which can add an additional layer of ambiguity to an already ambiguous domain.

This begs the question: are the prerequisites of clear goals and unambiguous feedback (which can be considered two sides of the same coin: Keller and Landhäußer 2012) as vital to the development of flow in the creative domain as has been previously suggested in relation to less subjective domains? These factors may in some ways be undesirable components, both to creativity and to flow. Tolerance of ambiguity is a common personality variable of creative people (Comadena 1984; Merrotsy 2013; Zenasni et al. 2008), and the creative process is an iterative process

that is believed to necessarily change its goals on a continual basis in dialogue with the physical world (Dewey 1934; Glăveanu 2013; Suwa and Tversky 1997). It is adaptability to the vagaries of chance that defines and drives the creative process.

Since creative criteria are subjective (as evidenced by frequent public controversy over avant-garde art), creative individuals need to be more tolerant of this factor than others in other fields may be. Tolerance of ambiguity may therefore be another factor in Csíkszentmihályi's (2002) proposed *autotelic* personality, i.e., the personality type most likely to experience flow, particularly in creative pursuits. Those who choose to go into creative professions seem to see ambiguity as a chance for exploration and discovery rather than uncomfortable uncertainty, and therefore a lack of clear goals and feedback during the process may not so much impede flow as feed it.

However, even if ambiguity and clear goals are necessary for creators, the way that creators achieve clarity in a profession with ever-changing and subjective standards of success requires further study. Many of the creative scientists Csíkszentmihályi (1996) spoke to mentioned that an important form of self-feedback was the ability to tell the difference between fruitful and unfruitful ideas early in the creative process. Likewise, Perkins (1981) identified the ability to be critical and discerning as a more important skill for creative success than being able to simply generate novel ideas. If unambiguous self-feedback is in fact essential to both creativity and flow, it would stand to reason that those creators who possess and make use of certain cognitive abilities and tools which allow them to examine their initial ideas as vividly and as accurately as possible will be more likely to experience creative flow throughout the creative process. These cognitive tools will help translate ideas into successful physical reality and to filter unfeasible concepts early, before expending energy on executing ideas that will not work.

However, what are these cognitive skills that enable an artist to achieve these goals and thereby, perhaps, flow? This is a question that needs to be addressed and could begin to explain how the processes of self-evaluation help to facilitate or hinder flow. Some work has been done recently, showing that mental and physical self-feedback, and differences between expectations and outcomes, may affect flow differentially. For example, access to perceptual feedback through sketching may help to clarify mental imagery self-feedback during the conceptual phases of visual creativity. Additionally, the consistency of self-feedback – for instance, whether expectations match outcomes, and self-surprise – may also play an important role in flow (Cseh et al. 2015b). However, more work needs to be done to understand the reasons behind the links and to explore other cognitive feedback processes important for flow to occur.

6.3.2 Self-Feedback and Dual-Process Thought

Perkins (1981) argued that evaluation during creativity is neither explicit nor implicit, but a combination of the two. Perkins carried out experiments with artists, poets, etc., asking them to give a running verbal commentary about their process as

they created a piece of work. He found that creators referred to intuitive evaluative feelings about why things were good or bad about their work, but then tended to localize the reason for that judgment in more analytic terms 50–80 % of the time, such as 'good because this colour unifies the whole' or 'bad because the ending is clichéd', implying that there is conscious analysis mixed with intuitive feelings about why an artwork is deemed successful or not.

According to Csíkszentmihályi (2002), evaluating skill in flow must be implicit, because a characteristic of flow is the loss of conscious self-reflection, and focusing on the self would interrupt concentration on the task. The validity of this assumption is questionable, however; Delle Fave et al. (2011) noted that in fact many people show more self-consciousness than usual during flow. Confusion about this flow dimension might arise from the fact that self-monitoring is not always seen by respondents as negative, and that it is an essential contributor to the unambiguous feedback component, which requires analysis of how an idea or action relates to both the self and the external world.

This leads to a conflict in theories of creativity and flow. Allen and Thomas (2011) suggest that creative thought is always a combination of type 1 (intuitive, spontaneous, unconscious) thought processes and type 2 (deliberate, conscious, analytical). This is reflected in the current twofold definition of creativity: something is creative if it is novel (generating uninhibited, unusual ideas and associations; i.e., type 1 thought), but checked by its usefulness and practicality (analysis of appropriateness to a purpose, i.e., type 2 thinking: Mumford 2003; Sawyer 2006; Sternberg et al. 2005). Flow, however, is mainly characterised as solely type 1 thought.

6.3.3 Automaticity, Hypofrontality Theory, and Dual-Process Thinking

Dietrich (2004a) proposes that many of the experiential 'symptoms' of flow, such as lost self-consciousness and time distortion, are a result of a temporary hypofrontality that occurs in the brain – executive and deliberate (type 2) functions like self-awareness or conscious decision-making are inhibited. The automatic nature of flow is considered a result of highly practiced skills being deployed without needing to invest much conscious thought on decision-making, allowing intuitive, unconscious systems to take over. If creativity is always achieved in eureka moments of sudden insight (type 1 thought), then this hypofrontal neural pattern of flow makes sense. There is a plethora of research and anecdotal accounts that suggest many creative insights happen spontaneously without prior conscious work (Ghiselin 1952; Gilhooly 1996; Perkins 1981) – the basis for the 'divine inspiration' myth of creative genius (Sawyer 2006) – and certainly there are technical aspects to creating that are practiced to the point of becoming automatic. It could therefore be argued that flow is more likely to occur during these moments of creating that are spontaneous rather than deliberate. However, this dismisses the fact that although some parts of creativity happen automatically, outside the conscious control of the creator,

there are other equally important stages and processes that cannot happen without higher-order executive processing, such as evaluation, decision-making, working memory, cognitive control, and so on, at least in some forms of creativity (Allen and Thomas 2011; Dietrich 2004b).

In ancient times, creativity was considered a gift from the Muse, a divine inspiration passively received from a mysterious external source, rather than actively pursued and generated by the creator (Plato, 380 B.C.E./2009). Today we know better; we are aware of the unconscious and its ability to produce thoughts without the creator having conscious knowledge of their origin. Science now considers creativity part of everyday cognition, simply a form of problem-solving that humans are universally capable of to varying extents (Finke et al. 1992). Yet the generation of creative ideas is still spoken of in terms of impromptu and passive experience, though this is at least in many circumstances a myth (Sawyer 2006). When flow during creativity is described, it is the unconscious side of creativity that is highlighted. The painter looks up from her painting hours later only to think 'did I do that?' The sculptor feels as though he is one with the clay, not separate or thinking about what to do next, but simply melting into the activity without awareness of acting upon his medium.

However, some forms of creativity are more deliberate, which Dietrich himself acknowledges (2004b), and these creative actions rely more heavily on type 2 analysis and conscious trial-and-error processing. For example, the 9-to-5 workaday designer or engineer must produce work on demand and to deadlines, and it is possible that they still experience flow under these conditions – flow is, after all, often experienced in the workplace. Does experiencing flow while consciously generating and evaluating ideas preclude the hypofrontality theory of flow? Oliverio (2008) has argued that novelty-production in the creative process may follow the implicit cortical systems in regions like the basal ganglia, but that the flipside of the creativity coin – the analytical selection of an idea that is also appropriate to a purpose – or the deliberate synthesis of ideas requires high activation of the prefrontal cortex, and that this appears to contradict the notion of creative flow as simply a period of hypofrontality. After all, some executive processes (such as attentional focus) are highly functional during flow, while others are not.

Flow is also believed to require a sense of autonomy and intrinsic motivation (autotelic experience/reward), suggesting that having conscious control over the details of an activity could enhance flow. Having access to choices and exerting control during the creative process (and in general) can both enhance (Amabile and Gitomer 1984) and reduce creativity (Finke 1990), and may influence motivation and feelings of task difficulty and enjoyment in paradoxical ways (Iyengar and Lepper 2000; Schwartz 2004). Exerting choice requires cognitive effort (Payne 1976; Timmermans 1993), using higher order executive functions such as working memory, attention, self-referential analysis, and of course decision-making. Since creativity requires making decisions that have not been made before (novelty), from a practically infinite array of possibilities, the cognitive load during certain instances of creativity would also seem to contradict the view of a hypoactive prefrontal cortex. Additionally, research on frontotemporal dementia effects on creativity suggest

that decline in executive regions of the brain – a more severe and permanent form of hypofrontality – can disinhibit rule-based and conventional processes to produce an initial boost in the novelty aspect of creativity, but that it can also inhibit planful behaviour and thereby impair the more formal, technical aspects of creativity and its appropriateness (Joy and Furman 2014).

Hence, flow during creativity and other cognitive pursuits may not hinge on unconscious automaticity due to practice to the same degree as it appears to in more regimented and physical activities, but may benefit from conscious decision-making and the deliberate exercising of control and choice. The hypofrontality theory of flow seems plausible for the majority of flow activities because it fits well in regards to the highly-practiced activities on which flow research usually focuses, but may not fit (at least not all) creative endeavours. Hypofrontality theory also seems at odds with the flow of thinking; however, Csíkszentmihályi (2002) devotes a chapter of his book to flow that occurs specifically in complex cognitive activities such as playing chess or solving difficult puzzles, which require extensive use of conscious, analytical, and executive functions.

Csíkszentmihályi alluded to the contradictory nature of flow by noting the paradox of control (2002) that occurs in flow. The person in flow feels in control of their actions and that their skills are adequate to meet the challenges of the task; but simultaneously, the experience feels automatic, as though it were happening outside of their control and with no effort on their part. Creativity too is dual in nature (Allen and Thomas 2011; Gilhooly and Murphy 2005). Examining these two paradoxical states together – flow during creativity – could potentially tell us more about the dual nature of consciousness and how implicit and explicit thought pathways may interact and complement one another to achieve the creative flow experience. An overemphasis on automated, mainly physical activities over less automated, mainly cognitive ones when researching flow runs the risk of over-generalising principles of flow to domains where it may not be appropriate to do so.

Furthermore, self-evaluation processes in creativity are complex and still poorly understood (Kozbelt 2007; Runco and Chand 1994). What is required is an in-depth understanding of the cognitive mechanisms that underlie the self-feedback system and creative cognition during flow. The specific pattern and degree of hypofrontality may differ significantly between different domains and activities, and result in subtle but essential differences between subjective flow experience in separate activity domains, and could also signal unique facilitating components and consequences.

6.3.4 Creative Flow and Affect

One of these purported consequences of flow is that it leads to greater happiness – both acute, short-term improvements to affective states (Cseh et al. 2015a; Rogatko 2007) and longer-term life satisfaction and wellbeing (Asakawa 2010). However, this warrants re-examination specifically in a creative context, particularly as the link between creativity and affect is still debated by researchers (Kaufmann and

Vosberg 1997). The literature on the relationship between flow and affect has been covered previously by Landhäußer and Keller (2012) and is discussed more fully in Cseh et al. (2015a). The consensus shows mostly significant links between flow and positive affect, though the causal direction of the link is unclear, and occasionally the link is not found.

Baas et al. (2008), in a meta-analysis of creativity-affect research, show that creativity can be facilitated by positive affective states, which is in line with Fredrickson's (2001) *broaden-and-build* theory. The affective consequences of creating are less clear, but some research suggests that the type of creative activity undertaken influences affect, with divergent thinking linked to increased positive affect, and convergent thinking linked to increased negative affect (Akbari Chermahini and Hommel 2012). Doubtless, there will be an enormous number of factors within the creative process that influence affect, but it is possible that experiencing flow is one of those factors; however, once again causal impacts of the variables on one another must still be determined. If creativity improves mood, is flow a mediator? Or does happiness facilitate not only creativity but also flow, a possibility proposed in Cseh et al. (2015a)? Although most flow-affect research has identified that flow is linked to post-task positive affect, more experimental evidence of a link to *changes* in affect (Cseh et al. 2015a; Rogatko 2007) and exploring how flow relates to more nuanced categorisations of emotion than simply the positive-negative polarity (e.g., activating vs. deactivating affective states: Baas et al. 2008) is necessary. Additionally, how both affect and flow relate to creative performance levels must be addressed to determine how flow factors into the cognition-emotion relationship.

6.3.5 Creative Flow and Enhanced Performance

Although self-perceived competence is a variable that is theoretically linked to flow (flow is only experienced when skills are thought adequate to cope with challenges), evidence of a direct causal impact of flow on enhanced objective performance is too often assumed and/or generalised to all activities (Nakamura and Csíkszentmihályi 2005), despite only correlational (Jackson et al. 2001; MacDonald et al. 2006) or lack of convincing supporting evidence (Cseh et al. 2015a; Keller and Bless 2008; Keller and Blomann 2008; Landhäußer and Keller 2012).

Landhäußer and Keller (2012) note that there is very little evidence to date about the flow-performance link in cognitive pursuits; therefore more work needs to be done to determine if and how flow contributes to cognitive achievement like creativity. Some research has shown that similar altered states such as those experienced during meditation can improve subsequent creative abilities (Colzato et al. 2012); electrical brain stimulation that induces a form of transient hypofrontality has also been shown to improve learning abilities (Clark et al. 2012) and mathematical problem-solving (Chi and Snyder 2011). However, it is not clear whether flow states (not necessarily the same phenomenon as hypofrontality or meditative states) would also have this effect on specifically creative cognition, and if so, why.

If this alleged flow-performance link truly exists, this too may differ between domains, and requires more empirical evidence either way. Privette and Bundrick (1991) and Csíkszentmihályi (1988) have cautioned that flow and objective peak performance do not always correspond and that the terms should not be used interchangeably, as they can be in sports research (Murphy 1996) or in popular accounts of flow (Adee 2012; Fox 2011; Kotler 2014). Even without immediate and acute influences on performance, flow may still be linked indirectly to performance over time, through its motivational influences. More longitudinal work should be conducted to determine whether flow leads to behaviours which contribute to greater achievement in a shorter amount of time, e.g., more time spent practicing, greater perseverance over obstacles, and so on. Assumptions that flow helps foster greater creativity are therefore premature and require much more experimental evidence.

6.4 Summary and Conclusion

This chapter has proposed that the conditions of flow are not uniform across activities and domains, despite previous qualitative research suggesting universality of the theory. In particular, the lack of clear goals and unambiguous feedback components of flow may not necessarily impede flow during creativity. Generally, the evaluative processes during both creativity and flow require further specific work.

The currently popular theory that flow is characterised by a period of hypofrontality (Dietrich 2004a) is at odds with a dual-systems view of cognition-intensive and deliberative activities like certain kinds of creative thought. More nuanced work to determine the neural patterns that help foster both creativity and flow at the same time should be explored, and whether different patterns distinguish flow during different activities – and why – should also be examined.

The affect and performance outcomes of flow also require more experimental evidence, and should examine more complex and subtle relationships, particularly since these are areas with which creativity researchers also continue to struggle.

It is my hope that more researchers will take up the reins to rigorously and specifically investigate which unique conditions of the creative process lead to flow within creativity, the neural patterns of different types of creative flow, and the long-term, meaningful outcomes of creative flow.

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