Does willpower relate to free will?

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1. Introduction

The concept of willpower and its potential connection to free will, though of interest in both scientific and philosophical discourse, has not been comprehensively unified or directly explored. While willpower is frequently discussed in the context of self-control and human behaviour, free will is often examined in terms of autonomy and decision-making processes. These concepts have been studied independently, without forming a cohesive framework that connects them. This thesis proposes a novel approach to understanding willpower as a critical element of free will, integrating contemporary neurological insights with philosophical theories to bridge this gap.

One prominent figure who epitomizes extraordinary willpower is David Goggins (Never Finished: Unshackle your mind and win the war within, 2024), an ultra-marathon runner and former Navy SEAL renowned for his ability to endure extreme physical and mental challenges. Goggins' story is one of overcoming immense adversity through sheer will, raising the question of whether such profound willpower equates to a form of ultimate freedom. His achievements, which include completing numerous ultra-marathons and setting world records, challenge our understanding of human potential. David Goggins' journey is marked by a relentless pursuit of self-improvement and a refusal to succumb to physical and psychological barriers. His experiences provide a compelling case study for examining the nature of willpower and has inspired the creation of this thesis which investigates whether the extent of willpower influences or determines the breadth of our free will. Goggins often describes his challenges as self-imposed tests to push beyond his perceived limits, suggesting that his willpower is not just about enduring pain but about seeking personal growth and mastery over his own mind and body. This intense drive and ability to overcome what seems insurmountable have made him a symbol of human resilience and will.

Harry Frankfurt, a prominent philosopher, has significantly contributed to discussions on free will and human agency. His seminal paper, "Freedom of the Will and the Concept of a Person" (1971), introduced the concepts of first- and second-order desires, providing a framework to understand human motivation and the nature of free will. Frankfurt argues that free will is characterized by the alignment of one's first-order desires (immediate wants) with second-order volitions (reflective endorsements of those wants). This hierarchical model of desires has been influential but also subject to critique and ongoing debate. Recent discussions on free will often

revolve around the compatibility of free will with determinism (compatibilism vs. incompatibilism), the nature of moral responsibility, and the neurological underpinnings of decision-making.

The anterior midcingulate cortex (aMMC) is a brain region associated with cognitive control, decision-making, and emotion regulation. Discovered through neuroimaging studies in the late 20th century, the aMMC has been linked to perseverance and the ability to maintain focus and effort in challenging tasks. Research by Touroutoglou et al. (2020) highlights the role of the aMMC in managing effort and regulating negative emotions, suggesting that sustained exertion can enhance its function by enlarging grey matter in this area. This makes the aMMC crucial for understanding willpower and tenacity. Dopamine circuits, specifically the dopamine desire circuit (dDC) and the dopamine control circuit (dCC), are central to our understanding of motivation and self-regulation. The discovery of these circuits dates back to the mid-20th century with the identification of dopamine as a neurotransmitter involved in reward and pleasure. The dDC is associated with immediate, impulsive actions driven by cravings and rewards, while the dCC supports strategic planning and self-control by regulating dopamine release in different brain regions. Recent research, such as that by Lieberman and Long (2018), has deepened our understanding of how these circuits influence behaviour and decision-making.

In this thesis, I will explore the relationship between willpower and free will by integrating contemporary neurological insights with philosophical theories. The central research question is: How do contemporary neurological insights into dopamine and the anterior midcingulate cortex (aMMC) refine our understanding of Harry Frankfurt's theory of first- and second-order desires in the context of exercising free will? To address the research question, I will first present the relevant scientific literature on dopamine and the anterior midcingulate cortex (aMMC) in Chapter 2, highlighting their roles in motivation, self-control, and perseverance. Following this, I will delve into Frankfurt’s theory of desires and free will. In Chapter 3**,** I will draw parallels between Harry Frankfurt's philosophical theories of first- and second-order desires and the scientific understanding of dopamine circuits. This chapter will analyse how these theories align and diverge and introduce the concept of resolve to illustrate how individuals can act against their immediate desires through willpower. Chapter 4 will examine the role of willpower in aligning actions with one's true self, arguing that willpower is essential for exercising free will. Finally, Chapter 5 will discuss the limitations and potential objections

to my interpretations, considering how biological constraints, such as the finite nature of willpower, may impact our freedom. By integrating insights from neuroscience and philosophy, this thesis aims to provide a comprehensive understanding of the relationship between willpower and free will, challenging traditional views and opening new avenues for research into human agency.

2. State of the art Science and Philosophy

2.1. The Dopamine Desire Circuits

The goal of this section is to provide a detailed overview of the dopamine desire circuits (dDC) and control circuits (dCC) and their roles in human motivation. It will explain how dopamine influences our cravings and decisions by detailing the mechanisms behind dopamine spikes and troughs. Additionally, it will discuss the differences between the desire circuit, which drives immediate, impulsive actions, and the control circuit, which supports strategic planning and foresight.

Dopamine has become one of the most well-known molecules. This small and basic structured molecule is what brings about our drive and motivation. Dopamine is very powerful and almost impossible to resist. This is evident in our everyday lives when we try to resist things we desire in the moment in light of our future goals. For example, resisting eating the slice of cake because you want to limit your sugar intake. Or resisting drinking more than one cup of coffee in the day because too much caffeine affects your sleep at night. The reason we crave these things so desperately is due to dopamine. The dopamine molecule is synthesized in the brain and with cues from the external environment (or certain thoughts we may have) it gets transported to other regions of the brain where it acts as a neurotransmitter which influences how we feel. The exact regions and neural pathways of this mechanism is not important for the purposes of this thesis but is explained extensively in Lieberman & Long (2018).

There are two dopaminergic pathways in the brain. The dopamine Desire Circuit (dDC) and the dopamine Control Circuit (dCC). They release dopamine in different parts of the brain which causes each pathway to have a different effect on how we feel and think. There is a common misconception in the mechanism of dopamine.

It is generally thought that the reason we crave these things is because they cause our dopamine to spike when consumed, i.e. the dopamine concentration level in a particular region of the brain increases above baseline and increase feelings of pleasure (Lembke, 2021). The actual

mechanism is a little more nuanced. The dopamine spike occurs upon the thought of doing a particular thing, and after the spike there occurs a trough, or a dip. In other words, the dopamine concentration in a particular region of the brain decreases below baseline (Lembke, 2021). This dip is the source of powerful cravings. The feeling of dopamine deficit is deeply unpleasant and hard to ignore. We want to replenish it back to baseline or better, beyond. Giving into these cravings can be intensely rewarding. Yet the reward is temporary (Lembke, 2021). The mechanism behind this phenomenon is called the dopamine Desire Circuit (dDC).

Giving in to cravings is often followed by regret if they are uncontrolled. Although we desire to do things in the moment, another part of us does not actually want to indulge. There are different mechanisms at play here that cause this clash. The feelings that contradict the desire circuit come from the dopamine control circuit (dCC). The dCC works similarly to the dDC except that the pathway excretes dopamine in a different region of the brain, and thus has a different effect. When the dopamine from dCC is excreted in the other part of our brain, it plays a crucial role in our ability to engage in strategic planning and make well-reasoned decisions. For example, when one feels tempted to eat a sugary treat in front of them, they are able to have the foresight to see the consequences of their actions and decide not to eat it. Although this is not immediately rewarding, one would feel glad they were able to resist at a later point in time. The control circuit allows us to analyse a situation and see the consequences of the actions we could take and help us decide which action will give us the best future (Lieberman & Long, 2018). This is why understanding the role of dopamine is so important in understanding our motivations.

So the dCC is the mechanism in place in our brains to control the desire circuit. To reiterate, the desire circuit does not contribute to us having any kind of foresight or logical planning. It is purely about giving us cravings for the present moment, no matter what it is[1]. It is also responsible for us avoiding "pain" in the sense that anything that makes us uncomfortable our desire circuit will make us want to leave that situation. The book 'The Molecule of More' by Lieberman and Long therefore draws a parallel between the dCC and willpower. More specifically, "dopaminergic" willpower is one of the tools of the dCC has in its arsenal.

[1] This mechanism is understood to be evolutionarily advantageous because resources were scarce. The brain constantly looks for resources and those who would, for example, consume those extra berries even though they weren't hungry were more likely to survive (Lieberman & Long, 2018).

2.2. The Anterior Mid-Cingulate Cortex

This section aims to explore the role of the anterior mid-cingulate cortex (aMMC) in willpower and tenacity. It will explain how the aMMC helps individuals persevere in challenging tasks by managing effort and regulating negative emotions. The chapter will also discuss how sustained exertion of effort leads to the enlargement of grey matter in this region, thereby enhancing an individual's ability to maintain focus and effort over long periods.

In a more recent study willpower is associated with an area in the brain called the anterior mid-cingulate cortex (aMMC) (Touroutoglou, Andreano, Dickerson, & Feldman, 2020). This paper uses word tenacity rather than willpower, but for all intents and purposes of this thesis, they are interchangeable. You cannot be tenacious if you have no willpower. And the common rhetoric around this topic agrees with this.[2] Willpower as it stands now has two scientific bases but there is no strict scientific definition of what willpower is or where it originates from. The function of the aMMC is to manage effort, predict energy requirements, and allocate resources for goal-directed behaviours. In other words, this brain region helps individuals maintain focus, exert effort, and continue working towards a goal even when faced with difficulties or obstacles. The interesting aspect of the aMMC is that it helps one persevere in the face of challenging tasks for prolonged periods of time *independent* of immediate rewards. It is even able to regulate negative emotions associated with challenges such as frustration or stress, supporting sustained effort and preventing disengagement from the task (Touroutoglou, Andreano, Dickerson, & Feldman, 2020). The other major aspect of the aMMC is that with sustained exertion of effort, the grey matter in that region enlarges. Specifically only for effort that we *do not want to do* but do anyway. For example, taking a cold shower in the morning. The feeling of cold is unpleasant for anyone, but forcing yourself to do it anyway strengthens and enlarges the grey matter including the aMMC. The larger the grey matter including the aMMC, the greater the ability to persevere over long periods of time at a specific task or goal, viz. tenacity.

The dopamine circuit (both the desire circuit and control circuit) works slightly different from this. The motivation to do specific tasks is based on the anticipation of rewards or pleasures. The control circuit has more thought out or weighed out benefits of the reward it wants, and the desire circuit craves any immediate reward it can attain. The aMMC is responsible for how long we persevere in attaining a specific goal even if there is no certainty of reward (because

[2] There are a number of podcasts on this topic most notably Andrew Huberman; a well-known American neuroscientists who speaks extensively on this topic (Huberman, 2024).

we might fail). Understanding these mechanisms is crucial to facilitate the discourse on the philosophy of free will because as we shall see in the fourth chapter of this thesis, will power and free will can be argued to be closely related. In this thesis, I will be using the scientific understand of willpower from the dopamine control circuit along with the aMMC. Both are important concepts that work synergistically for describing what we experience as willpower.

2.3. Harry Frankfurt's first order and second order desires

The objective of this section is to introduce and analyse Harry Frankfurt's theory on first-order and second-order desires. It will differentiate between these types of desires and explain their hierarchical relationship. This section will also discuss the concept of second-order volitions and their significance in Frankfurt's framework for understanding human agency and free will.

Harry Frankfurt's theory on first order and second order desires (Frankfurt, Freedom of the Will and the Concept of a Person, 1971) has striking similarities to the dopamine circuits. Frankfurt's contribution to philosophy of free will offers valuable insights into human agency. In his paper "Freedom of the Will and the Concept of Person" he differentiates between the types of desires a human can have and arranges them in a type of hierarchy. According to Frankfurt, there are first-order desires, second-order desires, and second-order volitions.

A first-order desire is when, say, a person "A" wants to do "X" where the object X is an action (Frankfurt, 1971, p. 7). Examples of first-order desires are such as wanting to go exercise (or not wanting to go exercise), wanting to eat a treat, wanting to take a break, etc.. It is possible to have multiple first order desires simultaneously. The first order desire that person A ends up acting upon is called A's will. In other words, the desire that motivates A into action is A's will and that desire is the *effective* first-order desire. Frankfurt emphasizes that an agents will is not just any notion that will incline someone into action, it is specifically the notion of an effective first order desire that moves someone into action.

Next are second-order desires. Second-order desires are desires about desires (Frankfurt, 1971, p. 8). In other words, they reflect a person's desire to have specific first-order desires. This requires a more reflective level of thinking where one evaluates and judges their first-order desires. Say for instance that you prefer unhealthy food to healthy food because it tastes better

and it is more convenient. Through critical thinking, you decide you want[3] to start living a healthier lifestyle. Your issue now is that you do not actually desire (in the first order) healthy food. And to eat healthy food you must desire (in the first order) healthy food. So your second order desire will be to desire healthy food so you will, in the end, eat healthy. It is also possible to have a second order desire to not have a first order desire. For example, you may also desire not to desire unhealthy food, so you are not tempted by it.

Lastly, second-order volitions. Frankfurt makes a crucial distinction between second-order desires and second-order volitions. A second-order volition is a type of second-order desire where one wants a certain desire to be their will (Frankfurt, 1971, p. 10). Using the earlier example, if you not only want to want to eat healthy but also want this desire to drive your actions (i.e., you want the desire to eat healthy to be the desire that motivates you), then it becomes a second-order volition. In certain cases, you may not want your second-order desire to be your will. There are many reasons for this because there are many reasons why one would have a second-order desire. For example, one may have the second-order desire to exercise, but they never want to actually experience the act of exercising even though they acknowledge it will be good for them. So they do not want this second order desire to drive them into action, therefore, in this case it will not be a second order volition.

According to Harry Frankfurt, having second-order volitions is essential for possessing free will (Frankfurt, 1971, p. 14). Frankfurt introduces the concept of personhood to distinguish beings capable of free will from those that are not. He defines a person as an entity that can reflect upon its desires and form second-order volitions, which are desires about one's first-order desires. This capacity for reflection and formation of second-order volitions is what differentiates persons from non-persons, such as animals. While animals can act freely by walking in any direction they choose, they lack the ability to form second-order volitions and therefore do not possess free will.

Frankfurt further elaborates on free will by making a distinction between merely acting freely and exercising free will. He argues that people exercise their free will when they can align their second-order volitions with their effective first-order desires. In other words, a person has free will if they not only have desires but also have the capacity to endorse or repudiate these desires

[3] To say “you want” in this sentence is not accurate in the Frankfurtian sense because this is not actually a first-order desire that you have. There is a language limitation in that sense. To say you “want” something in that way implies that you already desire it. That is not the case here.

based on higher-order reflections. If an individual's effective first-order desire (the desire that leads to action) aligns with their second-order volition (their reflective endorsement or rejection of the desire), then they are exercising free will. However, if there is a mismatch between their effective first-order desire and their second-order volition, they lack free will because they are compelled to act on desires they do not fully endorse. This compulsion signifies that their actions are not genuinely their own, undermining their autonomy and personhood.

3. Desires

3.1. Parallels between Frankfurt's theory and the desire circuits

This section aims to draw parallels between Frankfurt's philosophical theory of desires and the scientific understanding of dopamine circuits. It will explore how first-order desires correspond to the dopamine desire circuit and how second-order volitions align with the control circuit. This comparison will highlight the similarities and differences between these two perspectives on human motivation.

The first-order desires have resemblance to the dopamine Desire Circuit (dDC). The dDC is responsible for giving us cravings for certain things in the moment. We experience that by simply wanting to do a certain action. So the dDC can be seen as the *source* of the first-order desires we experience. The cravings from the dDC are involuntary. First-order desires, implied by Frankfurt, are involuntary. Frankfurt describes this phenomenon quite clearly when he refers to the "unwilling addict". An unwilling addict has the first-order desire (craving created by the dDC) to take a drug, but he has a second-order volition to not take the drug because he wants to be clean. If his first-order desire overpowers his second order volition, he feels "that the force moving him to take the drug is a force other than his own, and that it is not of his own free will but rather against his will that this force moves him to take it" (Frankfurt, 1971, p. 13). Here it is implied that first-order desires are involuntary. This is exactly the phenomena that occurs when the dDC is dominating in the brain. If this is the case you do not feel in control of your own actions.

The dCC can be seen as the source for second-order desires or volitions. Second-order volitions are your wants to want to do something that will move you into action. The dCC is really the more rational side of your brain calculating what it *actually* wants. If we continue with the unwilling addict example, the part of the addict that does not want to want to take the drug, likely comes from his reasoning that taking the drug negatively impacts their life. The rational part of his brain is telling him there are better things to desire than this drug. Or the rational

part of his brain is weighing up the consequences of the unbridled indulgence of the drug, and it is not in favour of it. After this reasoning process, the unwilling addict will have the desire to not desire taking the drug. Because as long as they desire the drug they will continue to take it. It is not in their control to change what they crave, they can only control what they want to crave. Therefore, the dCC has allowed the unwilling addict to create the second order volition to have the desire to not desire taking the drug.

3.2. Refuting Frankfurt's Theory on the Hierarchy of Desires

The goal of this section is to evaluate Frankfurt's hierarchy of desires and argue that it is unnecessary for understanding human motivation. It will present major critiques of the hierarchy, such as the issues of infinite regress and the unjustified favouritism of higher-order desires. By examining these critiques and Frankfurt's responses, this section will demonstrate the shortcomings of his theory. Furthermore, it will introduce the concept of resolve, showing how individuals can act against their first-order desires through willpower. This approach challenges the need for a hierarchical structure by proposing that motivation can be adequately explained without prioritizing higher-order desires, thereby simplifying our understanding of what drives human action.

A major critique is that Frankfurt does not adequately justify at any point *why* second order volitions have a superior status. I concur with Ralf Stoecker, who states “Yet although Frankfurt’s hierarchical concept of a person was very influential, it had a particularly weak point. It could not justify its glaring favouritism with respect to the higher parts of the soul. Why prefer the reflective, second-order attitudes to where our wants may lead us, to these first-order wants themselves?” (Stoecker, 2015, p. 104). Likewise, Watson (1975, p. 218) makes the same critique, questioning why a person would necessarily “care about one’s higher-order volitions”. The main critique by Watson is that the hierarchy of desires is susceptible to an infinite regress of higher order desires, which would be illogical (Peeters, 2016). These critiques are valid, but they fail to show whether this causes Frankfurt’s theory to break down. Frankfurt responds in a later paper by saying that although this is logically true, it doesn’t mean that it realistically happens (Peeters, 2016). Still, there is no explanation for the favouritism of the higher order desires. Frankfurt does state that second-order volitions are the result of careful deliberation of the person, therefore, potentially his stance on the favouritism of the higher-order desires are simply not adequately defended in his paper as he could easily make the argument that of course desires we choose through deliberation should have authority over

involuntary desires. However, I will demonstrate unequivocally that his theory of the hierarchy of desires does not hold up against the current understanding of what motivates people into action. This point is crucial as it fundamentally undermines the basis of Frankfurt's hierarchy, challenging its relevance and applicability in explaining human motivation.

Frankfurt's theory posits that every action you take stems from your effective first-order desire. It is easy to question whether this is truly the case. Must we always "effectively" desire (in the first order) the actions we choose over other possible actions? To explore this more concretely, we must examine a key source of willpower in our brain: the anterior mid-cingulate cortex (aMMC).

The aMMC is the part of our brain that helps us persevere in achieving our goals when we are struggling. It acts as a sort of muscle. The stronger it gets, the more we are able to persevere and consequently we experience a bolstered sense of willpower. The peculiar aspect is that to strengthen the aMMC, we have to do things that we particularly *do not want to do*. And this directly implies that we have to go directly against what our dDC wants, which means we have to go against our first-order desires. It sounds paradoxical to say that you must do something you "do not" want to do because, if you are doing it, wouldn't that imply you wanted to do it? This is not necessarily true. Consider that you are somewhere in a cold climate, and it is snowing and there is a layer of ice on the lake. All your instincts are telling you that it is cold, and you need to keep yourself warm. However, you want to challenge yourself and force yourself to jump into the icy cold water. At every point of the way you are extremely uncomfortable, very cold, and would want nothing more than to go home and sit by the fire to warm up. But still you continue. It is unfathomable to think that going in the lake is a result of some desire to be cold in the lake in of itself. The reason why this is a challenge for yourself is specifically because you do not want to be in the lake. And it has been scientifically proven that an act like this, that you do not want to, will strengthen the aMMC. This shows that Frankfurt's idea that one must have a first order desire for something to move one into doing that action is incorrect. It also would not make sense to have the second order volition to want to want to get in the lake because it is not about wanting to get in the lake. It is about forcing yourself to do an action that you do not want to do. Another way this can be seen is to consider "wanting to challenge yourself" as a first-order desire. In order to challenge yourself you must do some kind of work that is hard to do. Does it then logically follow that you must also desire the hard work? There are a few issues to note before this can be unpacked. Firstly, the notion of a "first-order desire" to challenge oneself does not align well with Frankfurt's conceptual

framework for first-order desires. Because as explained before, first-order desires are implied to be involuntary or not easily within ones control. In this case, the idea that one wants to challenge themselves is rarely some kind of impulse, it generally comes from thoughtful consideration because there must be some kind of reasoning process behind why one would want to challenge themselves[4]. Frankfurt might argue that it would first begin with wanting to want to challenge oneself, and from there the first order desire to want to challenge oneself arises. Again, this seems implausible, as people do not always deliberate on their desires through a second-order reflective process. Typically, individuals directly consider their desires rather than thinking about wanting to want something. Frankfurt claims that any meaningful deliberation only involves this second-order reflection. The other thing is, even if Frankfurt would be correct in saying that, how will this goal to challenge oneself be realised? If we define wanting to challenge oneself as the first order desire, it still doesn't logically follow that we would then desire to do the challenging task such as jumping into the frozen lake. Moreover, if we look at how the aMMC operates, desiring the challenging task will do nothing to strengthen the aMMC (Touroutoglou, Andreano, Dickerson, & Feldman, 2020), therefore, this shows that desiring the hard work from a challenge doesn't necessarily logically follow from desiring to challenge oneself.

To clarify the conclusion further, it is found that first order desires do *not* have to result only from dDC cravings. The understanding now is that deliberation can result in direct first order desires, such as the desire to do a challenge. This goes *against* what Frankfurt proposed. The need for second order desires or volitions is *not* necessary for deliberation (which doesn't mean they don't exist either. It is simply not required). The other point is that first order desires in the Frankfurtian sense are *not required* to move one into action. Which means that we do not have to crave to do a specific action for us to be able to do that action. We have the ability to do actions we do not feel like doing by utilizing willpower. The challenge now is how do we verbalise the inclination for one to jump in the lake if:

1. They do not have a first order desire in the Frankfurtian sense to jump in the lake
2. They do not have a first order desire from deliberation[5] to jump in the lake

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[44] There is some scientific backing to this as it is understood that evolutionary people have a predisposition to conserve calories/effort. So wilfully exerting effort requires some mental fortitude. (Lieberman D. , 2021)

[5] From here on I will specify where the desire originates from and from which theory I'm basing it on. When "from deliberation" is stated, that means the first-order desire originates from careful deliberation and is *not* a first order desire in the Frankfurtian sense which is involuntary.

3. They only have the first order desire from deliberation to challenge themselves (which they have decided to be in the form of jumping in the lake).

The issue prevalent here is still the presupposition that any action requires some kind of desire to do that action. I will introduce a new concept that forgoes this issue: resolve. This term is distinct from the terms mentioned above in the following way: having the resolve to perform an action in no way implies that the action is desired in any sense.

Even if one has a first order desire for an action that was deliberated on (and not caused by a craving) one can still *actually* desire that action. For example, deliberating on which restaurant to go to. Going to a restaurant doesn't necessarily imply that you have succumbed to your craving of eating out. Going to a restaurant often has a purpose, such as for socialisation or creating new experiences. Deliberating on which restaurant to go is an important procedure to ensure it will be a beneficial experience. The act of going to the restaurant is desired regardless of whether it was deliberated on or not.

To have a resolve to do an action, in the context of my thesis, implies the action is not desired, but is acknowledged to be a necessity. For example paying taxes. The act of paying taxes is not desirable in of itself yet it is a necessary action to undertake. Therefore, one has the resolve to pay taxes. Let's now refer back to the lake example. One has the *desire* from deliberation to challenge oneself. To realise this challenge, one creates the *resolve* to jump into the lake.

Frankfurt sought to explain why people experience conflicting desires and how these desires motivate actions. I have shown that conflicting desires arise from different mechanisms in our brain responsible for generating desires and motivations: the dopamine circuits.[6] We have now defined three ways one can be moved into action. One – the desires from cravings, two – desires from deliberation, and three – resolves from deliberation. In conclusion, Frankfurt's hierarchy of desires is insufficient to account for all instances of human motivation and an unnecessary framework to use when referring to desires that result from deliberation or cravings.

3.3. Identifying with Desires: Defence Against Critiques

Another interesting aspect of Frankfurt's paper is his attempt to explain why individuals identify with certain desires and not others. This element has faced significant critique and has

[6] Of course the brain consists of many different neurotransmitters such as serotonin for example that influences the way we think and behave. In this thesis I focus on dopamine because it is the neurotransmitter best known for its association with motivation.

often been dismissed too readily. In my view, making this distinction is one of the most compelling parts of his work. This section aims to defend Frankfurt's distinction between desires we identify with and those we experience as external forces. Building on the previous section's critique of the hierarchy of desires, this section will address common objections to Frankfurt's theory by using insights from dopamine research. It differentiates itself by focusing on why certain desires feel like they are a part of our true self while others feel alien. The argument will emphasize that desires resulting from careful deliberation are more likely to reflect our true selves, while impulsive desires from the desire circuit often feel uncontrollable and external. This distinction is crucial for understanding the deeper nuances of human motivation and self-identification with desires.

Watson highlights Frankfurt's goal by stating "One job that Frankfurt wishes to do with the distinction between lower and higher orders of desire is to give an account of the sense in which some wants may be said to be more truly the agent's own than others [..] ". He then critiques this by stating "though in an obvious sense all wants are of the agent". Peeters critiques Frankfurt's notion that an external desire (another term Frankfurt uses for involuntary first-order desires) is not a constitutive part of the person. Peeters questions rhetorically, 'If Frankfurt is right in thinking that the external desire is somehow not part of "the person", then whose desire is it? Should we assume the existence of free-floating desires?' (Peeters, 2016, p. 22).

With the knowledge we now have of the dopamine circuits, Frankfurt's idea of certain desires feeling like some kind of external force is not strange at all. The "external" desires he is referring to are the desires resulting from the dDC. They are completely involuntary, extremely impulsive, and difficult to resist. These desires are not a result of our own deliberation, so of course we do not identify with them and often we don't even want them at all (this is likely how Frankfurt invented his concept of second order desires, because of how we respond to our first order desires). The desires we identify with are desires that originate from careful deliberation because that is something we freely thought of and freely chose. In other words, desires that arise from careful deliberation are more likely to reflect our true self because they are the result of a considered process. This is what Frankfurt's theory endorses, as he argues that we identify with second order volitions because they result from reflective endorsement (Frankfurt, 1971).

Peeters attempts to critique Frankfurt's idea that conflicting desires occur when we identify with one desire but not the other. He believes that people show their "true selves" when they

have a conflict of desires, because through the conflict we can see what we really want. Peeters states that identifying and rejecting desires is a slippery slope to "excessive self-control to the extent of pathological self-doubt and losing our (authentic) spontaneity" (Peeters, 2016, p. 21). However, this view stems from a confusion about the actual sources of the desires involved. It is true that obsessive self-control can restrict your authentic self, but one must analyse what exactly is being controlled, as in, which desire are you controlling? Your cravings or are you trying to force yourself to be something you're not? No one really knows what their "authentic self" is. We generally try to estimate what aligns best with "ourselves" via careful deliberation and adjust our lives accordingly, which often includes putting ourselves in uncomfortable positions. But what makes us uncomfortable can be either due to going against our dDC cravings or something inherent to us. Only the latter will make us feel like we are at genuine conflict and don't feel like "ourselves". The difference is best explained with an example. Consider an extravert with social anxiety. They have the desire originating from their dDC that they do not want to engage with those around them (because it causes them pain, viz. anxiety). But through their deliberations they conclude that they do want to engage with people because they enjoy the companionship. They exercise their desire by going to events with lots of people. In this situation the extravert is extremely fulfilled by overcoming their immediate desires for the desires they freely deliberated on. Now consider another situation, everything is the same, except the person is an introvert. Attending events with lots of people is neither fulfilling nor satisfying for them; it is actually quite draining. This is not due to a conflict between their dDC desire and the desires from free deliberation. Instead, the conflict arises from the desire from free deliberation not aligning with their "inherent self". The introvert mistakenly thought that they may enjoy being around crowds of people if they pushed through the initial discomfort, not knowing that they had the introverted personality type. The introvert still wants companionship but not in the form of large groups. So they reassess and start reaching out to have one-on-one outings with the people they know, which is far more fulfilling to them.

More exploration can be done with this notion of "internal conflict" that occurs when desires from your free deliberation are at conflict with your "inherent self". But it is out the scope of this thesis. I have shown that the dDC isn't the source of desires we identify with, nor is it where the conflict comes from that Peeters mentions. Therefore, Peeters' critique on this aspect of Frankfurt's theory can be seen as somewhat of a strawman argument. I have demonstrated that Frankfurt's notion that individuals identify with certain desires while experiencing other types of desires as "external forces" is a valid perspective.

4. Free Will

The goal of Chapter 4 is to integrate the concepts of willpower and free will, expanding on how willpower is essential for exercising free will. The previous chapters laid the necessary groundwork by developing the framework and understanding of desires, which is a critical step before delving into the discussion of free will as the identification with desires is considered a fundamentally related aspect of free will. This chapter will critique Frankfurt's requirement for alignment between first-order desires and second-order volitions, proposing that free will involves the capacity to act against immediate desires using willpower. By leveraging the foundation of desires discussed earlier, this chapter will explore how willpower enables individuals to align their actions with those they identify with, offering a revised framework for understanding free will that highlights the central role of willpower.

Frankfurt was right in the sense that having strong desires is motivating; if a desire is strong enough, it will move one to action. However, the issue with Frankfurt's concept of free will is the requirement that one's first-order desires must align with their second-order volitions. This implies that only first-order desires can motivate an individual to act, meaning a person will only take action when they have a desire to do so. Furthermore, Frankfurt also does not adequately explain *how* one is supposed to change their first-order desires to align with their second-order volitions. From his paper, first-order desires are involuntary. Then how is one supposed to have some kind of control of their first-order desires to exercise free will? This notion is barely addressed. I will discuss these two aspects in this chapter.

Frankfurt's concept of free will centres on the *ability* to form second-order volitions. This is crucial because, as previously discussed, second-order volitions arise from free deliberation and represent desires that we truly identify with. This idea is most notably illustrated in his concept of a "wanton." A wanton is someone who does not have any second-order volitions; only first order desires or second order desires. This means that a wanton does not care about what his wills are because he doesn't desire that any particular desire becomes his will. The wanton "pursue[s] whatever course of action he is most strongly inclined to pursue, but he does not care which of his inclinations is the strongest" (Frankfurt, 1971, p. 11). Frankfurt argues that a wanton therefore does not have free will, it merely acts freely, like an animal. In his later works, he also clarifies this concept further. Stating that for one to exercise their free will, the desires that drive them must be internal and not "external" (Frankfurt, 1977). External in the sense as discussed in the previous section meaning desires that arise involuntarily instead of

through free deliberation – free deliberation being the “internal” desires. This notion separates Frankfurt from the traditional view which posits that free will consists merely in the ability to do or get what one wants (Watson, 1975, p. 205). So to not be a wanton and have freedom of the will, one must have the ability to identify with ones desires.

I concur with the notion that the ability to identify with one's specific desires is an essential component of free will. I will argue that exercising one's free will fundamentally involves the utilization of willpower. The definition of freedom is the absence of constraint. As Frankfurt indirectly pointed out, involuntary first-order desires that are strong enough to dictate one's actions serve as a constraint on free will. These types of desires prevent you from acting out the desires or resolves you freely choose for yourself and by extension you identify with. Free will is then the ability to do actions that you identify with without constraints. We possess the ability to overcome these constraints by utilizing our willpower. Although these involuntary desires continue to exert a pull on us, the strength of our willpower can prevent us from succumbing to them. Our will power allows us to act in a way that we identify with – in a way we freely choose for ourselves. It allows us to act in favour of our “internal desires” and overrule our “external desires”. Therefore, to possess free will, one must have the ability to exercise their will power[7]. It follows that those individuals with enhanced amounts of willpower are more free.

This framework for free will does not require an arbitrary hierarchy of desires to account for why we identify with particular desires, nor does it require that every action is motivated by a first order desire. Yet, it succeeds in achieving what Frankfurt's framework aimed to accomplish but ultimately did not. This is why it feels so satisfying to challenge oneself and work hard toward a personally set goal; in these moments, one is truly exerting free will. The moment one strays from this course and begins to give in to their external desires, the disappointment is felt almost immediately, because they weren’t able to do what they “wanted” to. Consider the common trope of procrastination. Procrastination is the failure of will power. Those who procrastinate rarely feel in control of their procrastination. “If only I could motivate myself to ….” Is not an uncommon sentence to hear among procrastinators. The only way to break free

[7] The aMMC and the dCC are both understood to be sources of willpower. Willpower gives individuals the ability to self-control their behaviours, delay gratification, and persevere in challenging tasks (Touroutoglou, Andreano, Dickerson, & Feldman, 2020) (Lieberman & Long, 2018). This thesis will not focus on how they differ or the details of the how they are realized. Therefore, in discussions about willpower, the exact source for it is unimportant. What is important, is that it exists and there is scientific evidence for its existence.

from this burden is through the strength of one's willpower. Once the task that has been put off for an indeterminate length of time is finally done – instant relief. This relief stems not only from the completion of the task but also from the satisfaction of having successfully motivated oneself into action. Or in other words, finally exercising free will.

The other aspect of Frankfurt's concept of free will that is inadequate is that he does not explain how someone can exercise their free will by aligning their first order desires to their second order volitions. In other words, there is no explanation on how one could possibly control their first order desires. It is only that you can deliberate on your second order desires/volitions. So how does this affect your first order desires exactly? Does that not imply that regardless of what your second order volitions are, you are still dependent on what your first order desires happen to be? In other words, regardless of what ones "internal desires" are, it is still the "external force" that is moving one into action. If free will is defined as the ability to perform actions that align with one's identity without any constraints, then relying on first-order desires would indeed be considered a constraint, thereby preventing one from exercising free will. The concept of will power does not rely on "external desires". One can be moved into action in spite of their external desires and in light of their desires from deliberation or resolves.

This section has shown that Frankfurt's concept of free will is not a sufficient description of free will. Instead, it is shown that willpower and identifying with ones desires or resolves is the key to free will and does not have the shortcomings of Frankfurts's theory.

5. Limitations and outlook

Chapter 5 discusses the limitations and potential objections to the interpretations presented in this thesis. This chapter will explore the complexities of identifying with desires, the finite nature of willpower, and the implications these have for the concept of free will. Additionally, it considers whether biological constraints inherently limit our freedom and how free will might be quantified similarly to willpower. The chapter aims to acknowledge the boundaries of the current analysis and suggest directions for future research on the interplay between biology, willpower, and free will.

The thesis asserts that identifying with one's desires is essential for the existence of free will, emphasizing that some desires feel "external" while others feel like one's own or "internal" because they have been deliberated on. However, this connection between deliberation and identification with desires warrants further exploration.

It is possible to deliberate on a wide range of desires, but not all of these desires necessarily reflect one's true self. Deliberation can occur over both significant and trivial desires. For instance, a person might deliberate extensively on maintaining an active lifestyle, which is a desire they deeply identify with. On the other hand, they might also deliberate on mundane decisions like choosing what to have for dinner, where the deliberation does not necessarily lead to a profound identification with the specific choice of meal, even if the choice itself (e.g., a healthy balanced meal) aligns with their broader values. Consider the concept of a "cheat meal" in a diet plan. A cheat meal is often meticulously planned and anticipated, suggesting a level of deliberation. Yet, whether this desire is truly identified with or merely a controlled indulgence of an external craving can be ambiguous. Is the desire for a cheat meal something one identifies with, or is it a mechanism to manage external desires within a controlled framework? This brings us to the potential necessity of distinguishing between different types of deliberated desires. Not all deliberated desires are significant enough to be considered a true reflection of one's identity. Some desires, although deliberated, are trivial in the grand scheme of things and do not contribute significantly to one's sense of self. Suggesting a more nuanced framework is needed to categorise desires. An alternative approach is to consider that identification with a desire does not necessarily mean it has to constitute a core part of one's identity. Instead, it can more broadly mean any desires that are not external, implying that they are not merely impulsive cravings but result from a reflective process. The implications of this nuanced understanding on free will are significant. If we accept that free will involves the ability to act on desires that reflect our true self, then understanding which desires we identify with becomes crucial. This distinction affects how we perceive freedom and self-control. Therefore, the connection between identifying with desires from deliberating on them needs to undergo a more critical analysis.

Another area for further exploration is the notion that willpower is a limited resource (Lembke, 2021). It is possible to train willpower like a muscle so it becomes stronger (Touroutoglou, Andreano, Dickerson, & Feldman, 2020), but that doesn't imply it can be infinitely strong. For most people, the limitation of willpower is obvious because it is experienced daily. Most people have, for example, their "ideal day" or "ideal morning routine" that they struggle to attain consistently. Only if they had unlimited willpower would they be able to maintain the ideal (perhaps). If free will is correlated with our willpower, then our free will is also inherently limited. For if willpower is limited, free will must also be limited. This raises important questions about the nature of our freedom. Does it then follow that, biologically, we will never

be completely free? Our biological constraints, such as the finite nature of cognitive resources and neural mechanisms, play a significant role in determining our capacity to exercise free will. This suggests that complete freedom is an unattainable ideal, inherently limited by our biology.

Furthermore, the idea of quantifying free will in the same way we measure willpower presents intriguing possibilities. Measuring willpower often involves assessing one's ability to resist short-term temptations in favour of long-term goals. Similarly, quantifying free will might involve evaluating how consistently individuals can align their actions with their reflective desires despite competing impulses. Understanding these limits and measures can provide insights into how factors like stress, fatigue, or environmental influences (or other factors) impact our capacity for free will.

Recognizing the limitations of willpower offers a realistic perspective on the nature of free will. It emphasizes the importance of developing strategies to manage and conserve willpower to enhance our freedom. Future research into the interplay between biology and free will could explore how we might optimize our cognitive resources to better align our actions with our true selves. Such exploration could lead to practical applications in enhancing self-control, improving decision-making, and fostering a greater sense of freedom in our daily lives. This perspective encourages us to understand and work within our biological limits to maximize our experience of free will.

6. Conclusion

In this thesis, I have examined the relationship between willpower and free will by exploring contemporary neurological insights and philosophical theories, particularly those of Harry Frankfurt. The analysis has shown that willpower, as understood through the mechanisms of the dopamine control circuit (dCC) and the anterior mid-cingulate cortex (aMMC), is essential for the exercise of free will.

Frankfurt's theory of first-order desires, second-order desires, and second-order volitions offers a valuable framework for understanding human motivation and freedom. However, this theory has significant limitations. It posits that free will requires alignment between first-order desires and second-order volitions, implying that individuals act only when they desire to do so. This does not account for actions driven by resolve where individuals act against their immediate

desires and offers no explanation on how one realises their higher-order commitments if they possess them.

Scientific insights into the dopamine circuits reveal that motivations can arise from immediate cravings or deliberate, long-term planning. The dDC drives immediate, often impulsive desires, while the dCC supports self-control and strategic decision-making. This aligns with Frankfurt's distinction between desires we identify with and those that feel external, highlighting the role of reflective endorsement in true freedom. Furthermore, the aMMC's role in sustaining effort towards challenging tasks, even without immediate rewards, emphasizes the importance of willpower in exercising free will. The enlargement of grey matter in the aMMC with sustained effort suggests that our capacity for willpower can be strengthened, indicating that free will can be developed.

This thesis argues that free will is not just about having desires but about the ability to act on desires that reflect our true selves, free from impulsive, external forces. Willpower allows us to overcome immediate cravings and pursue long-term goals and values, enhancing our freedom. The limitations of willpower as a finite resource raise questions about the nature of freedom. If our biological constraints limit our willpower, then that suggests our free will is also inherently limited.

In conclusion, understanding the relationship between willpower and free will provides valuable insights into human agency. By integrating neurological insights with philosophical theories, this thesis highlights the central role of willpower in exercising free will, challenging traditional views, and opening avenues for future research into the interplay between our biological makeup and our capacity for free action.

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