THE ENVIRONMENTAL ORGANIZATION OF ETHICS.

Groundwork of the Physics of Morals

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MASTER'S THESIS

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SUBMITTED FOR A M.S.C. IN

PHILOSOPHY OF SCIENCE, TECHNOOGY AND SOCIETY

AT THE UNIVERSITY OF TWENTE

JUNE 2017

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For the Eleatic Stranger

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"For what we want is not that Nature should coincide
with the laws of our mind *by chance* . . .
but that *she herself*, necessarily and originally,
should not only *express*, but even *realize*,
the laws of our mind, and that she is, and is called,
Nature only insofar as she does so"

(F.W.J. Schelling, *SWII*, 55–6; 1988: 41–2).

Descriptions of Abbreviations

A Kant, Immanuel. (1798/2006). *Anthropology from a Pragmatic Point of View.* [Anthropologie in pragmatischer Hinsicht]. Edited and translated by Robert B. Louden & introduction by Manfred Kuehn. New York, NY: Cambridge University Press.

KrV Kant, Immanuel. (1781/1786). *Critique of Pure Reason* [Kritik der reinen Vernunft]. Translated and edited by P. Guyer and Allen W. Wood. Cambridge: Cambridge University Press. The A version originated in 1781, while the B version stems from 1786.

KU Kant, Immanuel. (1790/2000). *Critique of the Power of Judgment* [Kritik der Urteilskraft]. Edited by P. Guyer and translated by P. Guyer and and E, Matthews Cambridge: Cambridge University Press.

KpV Kant, Immanuel. (1790/2000). *"*Critique of Practical Reason*"* [Kritik der praktischen Vernunft]. *In Immanuel Kant: Practical Philosophy.* Translated and edited by Mary J. Gregor. Introduction by A.W. Wood. Cambridge: Cambridge University Press, 133-272.

DA Aristotle, (350BC/2001b). "On the Soul [*De Anima*/Περὶ Ψυχῆς]." *In The Basic Works of Aristotle,* Edited by R. McKeon & C.D.C. Reeve. Chapel Hill: University of North Carolina.

EN Aristotle (340BC/2001a). "Nicomachean Ethics [Ethica Nicomachea/Ἠθικὰ Νικομάχεια]." *In The Basic Works of Aristotle.* Edited by R. McKeon & C.D.C. Reeve. Chapel Hill: University of North Carolina, 929-1112.

G Kant, Immanuel. (1785/1993). *Groundwork for the Metaphysics of Morals* [Grundlegung zur Metaphysik der Sitten]. Translated by J. W. Ellington. Indianapolis: Hackett Publishing Company.

H Aristotle, (350BC/2001). "On the Heavens" [Περὶ οὐρανοῦ]. *In The Basic Works of Aristotle.* Edited by R. McKeon & C.D.C. Reeve. Chapel Hill: University of North Carolina, 369-434 (epub version).

M Aristotle. (2001). "Metaphysics" [τὰ μετὰ τὰ φυσικά] *In The Basic Works of Aristotle.* Edited by R. McKeon & C.D.C. Reeve. Chapel Hill: University of North Carolina, 645-871 (epub version).

MAN Kant, Immanuel. (1778/2004). *Metaphysical Foundations of Natural Science*. [Metaphysische Anfangsgründe der Naturwissenschaft]. Tr. and ed. by M. Friedman. Cambridge: Cambridge University Press.

MS Kant, Immanuel. (1797/1997). *Metaphysics of Morals* [Die Metaphysik der Sitten]. Translated by Mary M. Gregor. Cambridge: Cambridge: University Press.

P Aristotle. (2001). Physics [Φυσικὴ ἀκρόασις/*Phusike akroasis*] *In The Basic Works of Aristotle.* Edited by R. McKeon & C.D.C. Reeve. Chapel Hill: University of North Carolina, 211-368 (epub version).

PM Kant, Immanuel. (1783/2004). Prolegomena to any Future Metaphysics. [*Prolegomena zu einer jeden künftigen Metaphysik, die als Wissenschaft wird auftreten können*]. Edited by G. Hatsfield. Cambridge: Cambridge University Press.

R Kant, Immanuel. (1793/1999). *Religion within the Boundaries of Mere Reason: And Other Writings* [Die Religion innerhalb der Grenzen der blossen Vernunft]. Cambridge Texts in the History of Philosophy. Cambridge: Cambridge University Press.

SW Schelling, Friedrich Wilhelm Joseph. (1856–61) Schellings sämmtliche Werke (SW), ed. K. F. A. 14 vols. Schelling, Stuttgart and Augsburg: J. G. Cotta'scher Verlag.

Abstract.

Contemporary environmental ethics considers how human beings affect environments. The Environmental-Organization of Ethics, instead, considers how environments affect self-governance capacities of agents. This thesis considers the effects of several technologies and their side products, such as artificial light, sound (noise and/or music), air pollution and exogenous environmental toxins, and contends that these technologies and their side products indeed affect agents' ethical choices.

As agents cannot act on the demands that ethical theories place on them without self-governance, self-governance is considered a necessary precondition for ethical action. It is argued that the aforementioned technologies affect ethical choices precisely because they either enhance or impede self-governance.

Failures of self-governance can be understood by recourse to inquiry in Philosophy of Mind, as agents acting contrary to their better judgment, or failing to live up to their resolutions—while successful self-governance consists in the opposites of such failures. For this thesis, the Philosophy of Mind perspective is called the *formal* account. From the perspective of contemporary empirical sciences, moreover, the aforementioned technologies can either negatively affect self-governing capacities in the human brain, or improve such capacities instead. This empirical perspective is called the *real* account. This thesis demonstrates that these two aforementioned perspectives, the *formal* conceptual and *real* empirical, can and do correspond to each other.

Ethical theories such as Aristotelean Eudaimonism or Kantian Deontology consequently supply an *ought* to these corresponding *formal* and *real* accounts. Phrased differently, the thesis not only attempts to describe how environmental technologies such as artificial light or exogenous toxins affect self-governance, but also argues that agents have *normative* reasons to optimize their self-governance capacities through shaping their environments.

The fact that technologies and their side products affect self-governance raises questions of whether agency is located inside agents themselves or established through environmental influences – *e.g.*, whether agency is located *internally* in agents or *externally* in their environments. In order to avoid causal determinism, an attempt is made to understand the Environmental-Organization of Ethics from F.W.J. Schelling's *Naturphilosophie*. Schelling considers both human agents and their environments as parts of nature, thereby not

dichotomizing between mind and body, or humans and an outside world. Nature is understood as *forces* – and the self-governance capacities of the human brain can also be understood as expressions of such forces. Human agents can self-govern themselves through an equilibrium of forces that is not present in many other animals – such exceptional human abilities include planning capacity or impulse control. Schelling's *Naturphilosophie* thus allows to create a naturalistic conception of self-governance while assuming a compatibilist account of freedom. As Schelling does not dichotomize between human agents and an "outside world of nature", self-governance can be understood as being co-constituted interaction between human bodies and their environments – environment and agent are parts in an *organic* whole – so that optimally shaped environments compel agents to be more prone to self-govern, while poorly shaped environments compel agents prone to fail in their self-governance.

THE ENVIRONMENTAL-ORGANIZATION OF ETHICS.

Groundwork of The Physics of Morals

BART WOLBERS[1]

I. Introduction.

This thesis does not concern itself with environmental–ethics in the *usual* sense. Environmental ethics typically concerns itself with humanity's influence upon the environment, and the ethical consequences thereof (Baskin, 2015; Crutzen & Schwägerl, 2011). On the contrary, this thesis investigates how environments affect the human will and ethical choice. Named the "Environmental–Organization of ethics", it will affect the status and interpretation of different ethical theories. Contemporary ethical theories do not usually accord an extensive role to the environment, but this thesis tries to argue against that tendency, and thus contend that environments do in fact influence agents' ethical decisions in significant ways.

A. The Ethical Role of Environments.

How can environments affecting the ethical decisions of agents be understood? Many contemporary ethical theories reduce the decisions of human agents to either intentions or desires – often locating these intentions and desires in the human brain or human mind – or both. Most theories subsequently assume that these desires and intentions are shaped and originate fully *internally* within human beings.

Let us consider how this *internal* or *external* realization of ethical decisions can be understood. In the *Nicomachean Ethics,* Aristotle distinguishes between the rational "higher" part of the soul [ψυχή] and the passionate "lower" part of the soul. The rational higher part of the soul is where the human capacity for rationality originates. The capacity for reason in turn, is a necessary precondition for deliberation (*EN*, 1094a), and deliberation is necessary to achieve a successful life [εὐδαιμονία] (*EN*, 1098a). Moreover, the rational part of the soul also determines

[1] 2016-201300085-2B: Masterlab II (2016-2B) student number: s1716360, 24.000 / 24.000 words.

what virtue is (*EN*, 1098b). Agents can fail, however, in their attempts to live up to these virtues and thus fail to have a successful life. One example in which agents can fail to achieve a successful life is when they experience "weakness of will" or *akrasia* [ἀκρασία]. In a state of weakness of will, agents act against their own better judgment. When agents act against their better judgment, their lower passionate parts of their soul dominates their higher part (*EN*, 1145a-1152a).[2] Even though agents *know* that it is better not to open that second bottle of wine, they open the bottle up anyway and begin consuming it, thereby being overcome by passion.

Stating that agents are in a state of weakness of will and therefore being overcome by passion, does not yet explain *how* these passions and weakness of will *originate*. From an Aristotelean perspective, agents need to develop good habits, preferably under the guidance of teachers – which will develop into a stable virtuous character when pursued continually (*EN*, 1003b). But this notion still does not demonstrate whether virtue is developed by a process that is fully *internal* within agents or partially shaped by factors *external* to agents.

Does developing a stable virtuous character mean that agents should continuously *internally* deliberate on how to act virtuously? Should agents habituate themselves to these virtuous actions by forming the right *internal* intentions, so that these *internal* actions then begin to exclusively shape their characters? Or should agents also shape their environments, if it can be demonstrated that environments affect agents' desires and intentions as well – which subsequently assumes that the path to virtue is partially determined by factors *external* to agents. In essence then, the question is whether *internal* factors within agents exclusively determine the outcomes of any action, or whether forces *external* to agents affect their ethical decisions as well.

B. Structures of the Will.

Philosophy of Mind uses abstract concepts such as "desires" or "intentions" to *describe* and *explain* human behavior, which can be called *structures of the will*. As concepts, structures of the will are very different from the denominations used in the empirical sciences. Neuroscience focuses on certain brain areas, such as the prefrontal cortex, or studies neurotransmitters such as serotonin and dopamine. These neurotransmitters and the activity of brain areas are important

[2] Aristotle worked within what is nowadays called a *cognitivist* tradition of emotions – *e.g.*, passions would always have an *object*, and Aristotle does not articulate a *subconscious* conception of emotions. The term "emotion" shall not be used for describing what Aristotle calls "passions" [πάθη], as the term "emotion" only emerged in the 16th century.

because many technologies and their side products have been empirically researched for their effects on human beings, mostly within the medical sciences. Examples are artificial light, that can influence the levels or (re-)uptake of certain neurotransmitters—or environmental noise and/or music affecting the brainwaves and attention span of agents. Technologies in the environment also generate side products, such as exogenous toxins, which can likewise (negatively) affect higher brain functions. The aforementioned structures of the will are tools within the Philosophy of Mind and allow one to reduce such very complex biological brain processes in the empirical sciences to concepts such as "desires" or "intentions". Instead of intricate descriptions of the states of affairs of neurotransmitters and hormones in a brain, that explain an agents' lust for wine, structures of the will thus simply allocate a *desire* for wine to agents. The aforementioned technologies and their side products have nevertheless not been linked to the structures of the will of Philosophy of Mind, *or* ethics.

As previous structures of the will remain abstractions, they cannot be reduced to certain brain states like the presence of dopamine or serotonin, or activation levels of the prefrontal cortex *on a one-on-one basis*. Nevertheless, many philosophers who think in terms of structures of the will still accept that these structures are *naturalistically embeddable* – for philosophers they *are* and *ought to be* fully commensurate with empirical science.

The argument will move abductively between examining how certain technologies affect the human agents from the perspective of empirical science to the structures of the will, and finally to a philosophical ethical perspective.[3] Because of the difficulty of translating the structures of the will to empirically observed phenomena and *vice versa*, the current thesis does not yield a proof by necessity.[4] In order to clarify the role of the environment in the decisions made by agents, and the status of contemporary ethical theories, the following research question will be addressed:

[3] Structures of the will are conceptualized plural – even minimalist theories posit at least two structures: beliefs and desires.

[4] A proof by necessity can be equated with an *apodictic* mathematical or deductive proof. On the contrary, as Aristotle already states that, "[o]ur discussion will be adequate if it has as much clearness as the subject-matter admits of" (*EN*, 1094b). Or following the words of Socrates, this proof "will be a proof that convinces the wise if not the clever" (Plato, 370BC/1997, 245c1). The clever who demand an apodictic proof will not automatically be convinced, but the wise may accept proof by the *likely* abductive method.

How do technologies and their side products in environments affect human agency, and does this effect influence the presupposed notion of ethical theories, such as Aristotelean Virtue ethics or Kantian Deontology, that agents can fully self-govern themselves *internally*?

C. Thesis Outline.

This section outlines how this thesis develops its argumentation to answer the research question. After a first section of introduction, section two through four develop a *formal* account of agency. This *formal* account of agency is described in terms of structures of the will. The second section introduces beliefs and desires as basic structures of the will. Minimalist conceptions of agency posit these structures of the will to *describe* and *explain* human agency. Section three subsequently explores intentions, plans and resolutions as additionally possible structures of the will. These structures entail that agents can act independently from desire, precisely by following their intentions, plans or resolutions. The fourth section demonstrates that the failure of agency can be understood as what is called "weakness of will" or *akrasia*, whereby intentions *fail* to fully regulate behavior. This section thus shows that weakness of will is *possible*—but possibility does not necessarily entail actuality in philosophy.[5]

Section five subsequently demonstrates that failures of agency can also be comprehended in terms of empirical research. This empirical perspective will be called the *real* account of agency, and indicate that failures of agency do actually exist outside the concept. From the perspective of empirical research, failures of agency are understood as failures of higher brain regions such as the prefrontal cortex and anterior cingulate cortex to regulate lower brain areas, such as the amygdala, thalamus and hypothalamus. When agents fail to self-govern, their lower brain regions can either be *overpowering* their higher brain-regions or the regulating capacity of higher brain regions can be *weak*. This section moreover demonstrates that the *real* account can be described in terms of the *formal* account. Phrased differently, the claim of philosophers that structures of the will are naturalistically embeddable is vindicated.

The sixth section establishes that two different ethical theories, Aristotelean Eudaimonism and Kantian Deontology, allow that failures of agency are *possible* within their respective theories (Aristotle, *EN*; Kant, *KpV; MS; G; R*). Both theories, moreover, assume that failures of

[5] In good Kantian fashion, the possibility to think the determination of a concept does not entail that the content of the concept exists in reality (*PFM*, 4:327-4:328).

agency *ought to be* avoided. Additionally, this section demonstrates that these ethical theories can also be understood in terms of the structures of the will and translated to these structures. The inclusion of ethical theories entails that agents have *normative* incentives to regulate themselves, so that their agency is not negatively affected. In other words, failures of agency under the *formal* and *real* accounts that correspond to each other, *ought to be* regulated from the perspective of these ethical theories.

Section seven demonstrates that environmental technologies and their side products affect the ethical choices of agents from the perspective of the *real* account, which is called the Environmental-Organization of ethics thesis. That environmental-organization is demonstrated according to three different instances, namely 1) artificial light; 2) sound, which includes both music and noise; 3) exogenous toxins, including air pollution and heavy metals. Under the *real* account, all of these technologies consist in fundamental physical and chemical processes—sounds and light can be found in the electromagnetic spectrum, and exogenous toxins are reducible to fundamental chemical elements. Moreover, because the previous sections connected the *formal* account to the *real* account, and both accounts to normative ethical theories, the normative content of ethical theories entails that agents *ought to* govern their exposure to aforementioned technologies.

The seventh section subsequently investigates how the Environmental-Organization thesis relates to existing theories that study the relation between environments and higher cognitive functions such as agency. Existing theories conceive environmental influences mostly in terms of behavioral cues. Cues affect agency in the sense that they are behavioral triggers—*e.g.*, agents might become more prone fail in their diets when they have temptations in their house instead of exclusively healthy foods. The Environmental-Organization of ethics thesis, instead, studies agency in terms of fundamental physical and chemical forces.

To avoid implying that the Environmental-Organization thesis explicates a causal determinism, section eight uses Schelling's (1775–1854) *Naturphilosophie* to envision how the evolutionary developed self-governing capacity of human agents is an expression of a relative predominance of forces in nature. Schelling understands nature as mutually opposing forces, where evolution and *life* are forces that express the universe's development towards order. Under Schelling's conception, modern scientific evolution can be understood as having resulted in the development of unique self-governing capacities in human brain, that are not present in (most)

lower animals.

Schelling also ontologically de-dichotomizes mind and body, envisioning humans as fully part of nature, while simultaneously maintaining that mind emerges from nature. Higher self-governing capacities such as reasoning or impulse control therefore become naturalistically embeddable, as expressions of forces—but simultaneously denote a capacity for freedom. Moreover, because of Schelling's de-dichotomization, technology and humans inhabit the same natural world, and technology can be understood as affecting equilibrium of forces expressed through human beings.

All-in-all, the Environmental-Organization thesis maintains that the effects of technology are not absolute, under which the environment fully determines the ethical decisions of agents—nor does it contend that the effect is absent. Instead, environments co-constitute the ethical choices of agents. Agents can consequently shape their environments to augment their self-governance capacities. Agents and environments are *parts* that together make up an organic *whole*.

Finally, section ten concludes that conceptions of agency under preceding ethical theories therefore merit augmentation, in that contemporary ethical theories ought to consider the role of environments upon the self-governance of agents.

II. The Minimalist Will: Beliefs and Desires.

This section explores minimalist conceptions of agency. Minimalist conceptions of agency posit *beliefs* and *desires* as the only existing structures of the will. Beliefs and desires are introduced here as foundational structures of the will, in order to introduce additional structures in later sections. Structures of the will are simple heuristics to *describe* and *explain* human agency, as describing and explaining human agency *via* beliefs and desires is less complex than explicating many intricate details understood as biological variables within human brains. The reason for introducing the structures of the will in the second to fourth sections, is to *understand* how agents self-govern – *i.e.* how self-governance can fail or succeed.

A summarizing schematic display of the different structures of the will posited by different philosophers can be viewed in Appendix I.

A. Reason as Passive Bystander.

David Hume and Harry Frankfurt both assume a minimalist conception of agency. Hume and Frankfurt contend that beliefs and desires are exhaustive for describing and explaining human

agency *via* structures of the will. Frankfurt is a modern-day Humean, and his philosophy can be considered a modern elaboration on Hume's 18th century conception of agency.

Hume's famous precept contends that "[r]eason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them" (Hume, 1740/2007, 82). Hume thereby allocates a very specific role to agents' reflective capacities, namely that reflective capacities stand by while desires (passions) rule agent's actions. The remainder of this section will focus on *Frankfurt's* modern interpretation of Hume's conviction.

Frankfurt explicates an intricate process of how agents relate to their desires. Agents can locate different desires in their person. They can then reflectively assess these desires. Next, agents can form attitudes towards their desires. Such attitudes are called *second-order desires*, which are desires regarding desires.[6] Ultimately, agents can either *identify* with their desires, allocating a place to these desires in their person—or they can distance themselves from them, thereby seeing that desire as remote and incompatible with their person's essence. However, both what agents identify with and their second-order desires cannot *cause* agents to act—what causes agents to act, are *always* basic desires.

Most desires are not based on *reason* but are "brute facts" that are given in agents. But second order desires, or what agents identify with, are not necessarily rational either. Agents can have attitudes as second order desires that are not based on *reasons*, or can identify with desires without having *reasons* to do so – all second order desires and one's identification *can* thus be based in *feeling* as well (Frankfurt, 1988; 1999a; 1999b).

B. Moral Responsibility.

An agent's structures of the will determine whether they are morally responsible for Frankfurt. Desires are *always* formed by external causes, including natural causes and societal influences. However, agents can still be held accountable when they fully *identify* with their desires (Stump, 2002; Frankfurt, 2002c). Frankfurt literally asserts that "agents may be morally responsible for what they have done even if they could not have done otherwise" (Frankfurt, 2002b, 27). This exemplifies a compatibilist conception of the will, where causal determinism and moral responsibility do not exclude each other (Fischer, 2002).

Let us consider an agent who practices self-governance. That agent shall be named Philebus,

[6] First-order desires will henceforth be named "desires", while second-order desires will remain titled as such.

and will recur throughout this thesis. Assume that Philebus has a desire to drink a glass of wine with dinner. He reflects upon this desire, and forms a second order desire about his desire to drink that glass of wine, which can be seen as an attitude towards drinking that wine. Philebus additionally identifies also with the desire, thereby seeing the desire as his own, and therefore fully commits to drinking the wine. He consequently becomes morally responsible for that behavior.

Nevertheless, one can also imagine Philebus having a desire to drink an entire bottle of wine. After reflection, he might form a second-order desire that the desire of drinking a full bottle of wine is undesirable. Despite the second-order desire not to go through with drinking the full bottle of wine, Philebus finishes the bottle shortly. It is very plausible that Philebus will not identify with the desire to drink an entire bottle, seeing it as an intrusion into his person's essence, which also signals that he is not morally responsible for that behavior.

C. Wills Reduced to Desires.

Frankfurt's conception of *persons* entails that persons always already have certain desires. Because desires are "brute facts", desires compel some actions to become unthinkable while others become volitionally necessitated (Frankfurt, 1988). Being a person with certain pre-given desires entails that one *cares* about something. Caring makes some actions unthinkable while other actions become volitionally necessitated (Frankfurt, 1999a).[7] Persons are therefore always already *necessitated* to act a certain way.

Philebus might care so much about his children that some courses of action become impossible – being the person he is makes him unable to will certain things towards his children. Another example might be soldiers that reflectively know that failing to fire at the enemy during war might get them killed—but the soldiers being compassionate persons might prevent them from shooting anyway.

All-in-all, Frankfurt denies that agents can have a *tabula rasa* wills that can determine itself in accordance with practical reason—the Frankfurtian will always already has content in the form

[7] The Frankfurtian agent's capacity for reflection does not mean that one can causally determine oneself according to practical reason (Frankfurt, 2002c). Nevertheless, agents might begin projects to eventually overcome their volitional necessities. Agents can *attempt* to shape their person in accordance with what they can fully identify.

of desires, and is moved thereby.[8,] Contemporary Kantians conversely assume that agents *can* determine themselves according to the representation of the Moral Law—thereby negating and acting *contrary* to their desires.[9] Against these Kantian criticisms, Frankfurt disputes that determinations of wills *sans* desires are possible (Frankfurt, 1999b, 132). Frankfurt therefore maintains that *reasons* are fully reducible to desires that agents want to satisfy.

D. Beliefs

Beliefs, as second basic structure of the will, concern the *states of affairs* that agents attribute to the world. Beliefs will henceforth be interpreted as "as all-out-beliefs" (Holton, 2014). Under all-out-beliefs, agents believe a state of affairs to be either absolutely true or not true at all. All-out-beliefs with probabilistic content are nevertheless possible, as Philebus might have an all-out belief with the content: "it is absolutely true that there is a 50% chance of rain tomorrow". As beliefs are generally a largely uncontested structure of the will, this thesis focuses now focuses on the often-debated intentions and their derivatives.

III. The Planning Theory of the Will: Beliefs, Desires *and* Intentions.

Section III includes *intentions* as a third structure of the will, alongside beliefs and desires. Consecutively, intentions are constitutive of *plans*, *policies* and *resolutions*. Phrased differently, intentions are the elemental constituents of plans, policies and resolutions.

A. *Intentions* Overcoming Desires.

Three decades ago, Michael Bratman argued that intentions cannot be reduced to what is encompassed by either beliefs or desires (1987). Intentions are an independent structure of the will that allow for a *cross-temporal* organization of agency. Precisely that cross-temporal aspect of human agency cannot be exhaustively described and explained based on beliefs and desires for

[8] This is best conceived in Bernard Williams' definition of internal reasons, whereby A has exclusive internal reasons when "A has a reason to φ *iff* A has some desire the satisfaction of which will be served by his φ-ing" (Williams, 1981, 101).

[9] Kantian critics contend that Frankfurt should accept reasons as *independent* from persons, so that agents can act independently from their desires (Herman, 2002). Even moral constructivist interpretations of Kant, that do not uphold that reasons are external from agents, still contend that agents *construct* reasons that may counter agents' desires (Formosa, 2013). Against this criticism, Frankfurt maintains that reasons for action originate from what one loves and cares about – thus always reducing reasons back to desires (Frankfurt, 2002a).

Bratman.

Frankfurt and Bratman both establish fully naturalistic conceptions of agency. Under naturalistic conceptions of agency, structures of the will need to be reducible to empirical scientific description of bodily states.[10] Such naturalistic conceptions oppose having to posit a "homunculus" that moves agents.[11] Structures of the will aim to be naturalistically embeddable instead, and thus seek to be accessories to *describe* and *explain* complex biological processes in simple terms.

Bratman's *intentions* unfold over time, thereby allowing agents to self-govern. In self-governance, "the agent herself directs and governs her practical thought and action" (Bratman, 2007, 4). Agents thus *intend* to do something in the future, thereby governing themselves, and these intentions can *causally* establish a course of action. [12,13] Intentions allow for the governance of desires through practical reason, as intentions have a *stabilizing* effect on the will. Intentions also causally affect practical reason again, as intending one course of action might preclude other

[10] For a classical definition of *reducing* one theory to another, assume that one has theory 1 (T1); theory 2 (T2) and observations (O) as states of affairs made under T2 (Kemeny & Oppenheim, 1956, 14). For the current argument, assume that T2 is a biological description of the brain from which one could deduce an agent's behavior, while T1 is the current attempt to describe and explain the same behavior in terms of structures of the will. The *conditio sine qua non* for successful reductions are:

"(1) Voc[abulary] (T2) contains terms not in Voc[abulary] (T1)

(2) Any part of O explainable by means of T2 is explainable by T1.

(3) T1 is at least as well systematized as T2."

A successful reduction thus entails that the states of affairs under T1, as the structures of the will, explain the behavior of agents equally well as the biological states of affairs under T2, while being at least equally well systematized.

[11] A classic objection to homuncular theories, is that when locating (causal) agency in a homunculus, the question emerges whether this homunculus really has agency, or whether it needs a homunculus of its own (Bratman, 2016). For a more elaborate criticism, see Gilbert Ryle's *The Concept of Mind* (1949, 19-20).

[12] Bratman assumes a Lockean conception of personal identity. For Locke, the personal identity was upheld by memories that last over time—for Bratman however, intentions, plans and policies yield coherence and consistency to a temporally extended personal identity.

[13] *Intentions* should not be confused with *intentional action*. Conceptions of intentional action do not concern the formation of intentions regarding the future, and fall squarely within the minimalist belief and desire model (Anscombe, 1957/2000; Davidson, 1963/1980). For a difference between *intentions* and *intentional action* within Bratman's model see: (Mele, 2014; Velleman, 2007).

courses.[14]

Intentions make self-governance possible. Self-governance is a necessary precondition allowing agents to act according to their values.[15] Values consequently give rise to *internal* reasons for actions. Both Frankfurt and Bratman thus maintain reasons as internal to agents—but contrary to Frankfurt, Bratman's intentions allow practical reason to govern agents' action. Bratman's agents subsequently identify with their desires when their intentions envision that desire as reason giving (1999). What agents *really* are for Bratman, consists in desires agents accept as reason giving.

Philebus might have the *desire* to drink a full bottle of wine with dinner, but might also have a desire accompanied with the *intention* not to drink anything. Philebus had already formed an intention regarding dinnertime in the morning, and when dinnertime arrives, one expects him to execute on that intention. Philebus does not identify with the desire to drink wine because he has formed an intention *not to drink wine* that evening. The intention is thus meant to *overcome* the desire.

B. Intentions Grounding *Plans* and *Policies*.

Intentions ground other structures of the will such as *plans*. Intentions, phrased differently, are the basic constituents of plans, as plans are "intentions writ large" (Bratman, 1987, 29).[16] Bratman assumes an independent existence of plans, precisely because plans help agents to not continually re-evaluate their choices. Without plans, practical reason would (re-)evaluate all alternative courses of action at every occasion. Such constant (re-)evaluations would cripple the possibility of self-governance, as minute alternations in circumstances would force agents to (re-)deliberate the merits of all alternatives again. As deliberations are never without costs, plans

[14] Intentions have additional formal requirements such as means-end coherence. This formal requirement means that if one *intends* the end, one should intend the means. However, anticipated byproducts of actions do not have to be intended (Bratman, 2016).

[15] Bratman contends that self-governance is both a *means* and an *end*. As means, self-governance is a necessary precondition for acting according to one's values—as an *end* however, self-governance has to be esteemed by agents for its own sake because one cannot act rationally without it (Bratman, 2016).

[16] Bratman's theory is therefore called the *planning theory* of the will. Bratman considers our planning capacity a "rule of rationality", making the transcendental argument that without coherence, stability and consistency in intentions and plans, human agents cannot possibly self-govern over time (Bratman, 2016).

allow agents to stick to *one* course of actions and thereby minimize the cost of continuous deliberation (Bratman, 2007). Newly created plans need to be consistent with previously existing plans. Moreover, as "intentions writ large", plans consist of plural mutually supportive intentions. Plans do not have to be fully crystallized though, as some specifics of plans can be decided upon later.[17]

Suppose that during the morning, Philebus *plans* to get work done in evening. Philebus might not have to plan every specific of his evening, but his plan to work will be inconsistent with planning or intending to go to the theater with friends. Moreover, the plan also entails having to intend immediately driving home after work instead of staying late and talking to colleagues. Philebus might also have to intend to refill the gas of his car on the way home—as he does not know how much gas is left in the tank, these gas levels will be verified later.[18]

Moreover, Philebus might additionally erect a *policy* not to drink any alcoholic beverages during the evenings—contrary to plans, policies are not specific regarding *when* they are carried out in time—instead, policies can be understood as an intention that stabilize and continually *re-appear* over time. A policy that holds today also holds in three months' time, regulating newly emerging desires through intentions over the course of time, without yet specifically targeting a specific desire.

Philebus might expect temptations during stressful situations—and anticipates regret when giving in to temptation (Bratman, 2014). At noon, Philebus might have an intention not to drink any wine that evening. But almost every evening his intentions *shift*. When stressed he will think that *just one* glass might help him relax. Remembering his policy, he anticipates regret, and therefore sticks to his previously erected policy. The anticipated regret thus allows agents to stick to the intentions making up the original policy, instead of being swayed by newly emerging intentions or desires under temptation.[19]

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[17] As *planning agents*, humans possess a categorically different agency compared to (most) other animals. Animals such as dogs, great apes and horses do not have the exact *same* planning capacity as human beings.

[18] Plans thus place pressure on intentions regarding consistency, and demand coherence and stability over time—but plans also structure distal intentions and need to be consistent with an agents' beliefs.

[19] Policies have been criticized as overly rationalistic accounts of agency. In some perilous situations, agents might have to throw all their plans and policies overboard (Milgram, 2014). Other criticisms are that plans and policies are not rationalistic *enough*, because agents can identify with desires without much deliberation (Wallace, 2014). A last

C. Second Order Intentions: *Resolutions*.

Richard Holton finally adds *resolutions* to the structures of the will (Holton, 2009a; 2009b). Holton conceptualizes resolutions as *second order intentions*, which are to provide even greater stability to our agency.

Philebus can make a New Year's Resolution to limit his evening wine consumption to a maximum of three glasses. After drinking three glasses of wine at a dinner party in January however, his confidence in his ability to limit his drinking reaches an *apex*. Philebus now thinks that he can limit himself to five glasses that evening, but likewise remembers his resolution to limit himself to three glasses. But Philebus *also* knows that drinking two more glasses now will make little difference for his long-term health.

Holton proposes resolutions as a *stronger* (2nd order) category of intention, precisely because intentions often change, especially during temptations. Moreover, judgment shifts during temptation might entail a conjoined change of intentions *and* desires—resolutions resist such reconsiderations and can strengthen agents' self-governing capacities cross-temporally.[20] *Contra* Bratman's policies, Bratman's resolutions as 2nd order intentions ought to be strong enough to overcome *any* shift in desires, beliefs and/or intentions (Holton, 2004). Bratman's policies' sole reliance on anticipated regret might often not be compelling enough.

With Holton's conception of resolutions, all different structures of the will have been laid out. Let us now consider how failures of agency can be conceptually understood.

IV. The *Formal* Account of Self-Governance.

This section develops a *formal* conception of failures and realization of self-governance. This conception entails that *akrasia* and weakness of will are understood in terms of the structures of the will of previous sections (II-III) – in other words, this section aids in understanding failures

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criticism is that Bratman's account is under-rationalistic, assuming that agents can exclusively be autonomous insofar they have *reasons* for their beliefs as well (McCord & Smith, 2014, 145). While taking note of such counterarguments against Bratman, no viable alternative theory currently exists.

[20] Reconsidering resolutions can be rational or irrational (Holton, 2009b, 17-18). Resolutions do not merit being re-considered when: 1) faced with the temptation that the resolution was meant to overcome; 2) one's state of judgment is diminished compared with when the resolution was made. Resolutions are rational to reconsider, however, when: 1) the initial goal of the resolution is no longer in place; 2) when resolutions have unexpected consequences. Rational re-consideration and irrational reconsiderations nevertheless remain continually in tension.

and realizations of self-governance.

Let us commence with the concept of *Akrasia*, which has a long history.[21] *Akrasia* [ἀκρασία] is defined as agents acting *against* their better judgment. The notion of *akrasia* originates in Plato's *Protagoras*, where Socrates asserts that "no one goes willingly toward the bad". Socrates follows that sentence up with the even more striking "or what he believes to be bad" (Plato, 390BC/1991, 358d). Phrased differently, even when understanding reasons as *internal* to agents, Socrates deems *akrasia* to be impossible. Aristotle, on the contrary, does envision *akrasia* to be possible – when the lower parts of the soul dominate the higher parts (Aristotle, 340BC/2001, 1145a-1152a). Such *Akratic* [ἀκρασία] actions are also called *incontinent* actions, while acting according to one's judgment is called *continent* or *enkratic* [ἐγκράτεια] action.

A. Davidson's Classical Definition of Akrasia.

Modern conceptions of *akrasia* build upon this classical foundation. Donald Davidson inquires how *akrasia* is possible (1980/2001). Davidson defines incontinent action thusly:

> "In doing *x* an agent acts incontinently if and only if: (a) the agent does *x* intentionally; (b) the agent believes there is an alternative action *y* open to him; and (c) the agent judges that, all things considered, it would be better to do *y* than to do *x*" (Davidson, 1980/2001, 22)."

Moreover, Davidson also posits two general principles of agency. The first principle reads:

> "If an agent wants to do *x* more than he wants to do *y* and he believes himself free to do either *x* or *y*, then he will intentionally do *x* if he does either *x* or *y* intentionally." (Davidson, 1980/2001, 23)."

And the second principle reads:

> "If an agent judges that it would be better to do *x* than to do *y*, then he wants to do *x* more than he wants to do *y*." (Davidson, 1980/2001, 23).

[21] The modern concept of a *will* has a long history. Plato, Aristotle and the Stoics *reduced* the will to judgments made by the intellect [νοῦς]. Some post-Antiquary philosophers, including Thomas Hobbes, rejected the concept of a will. The concept was nevertheless generally accepted from late Antiquity until the post-Kantian 19th century, but subsequently rejected by late-19th century German philosophy and the 20th century analytical tradition (Pink & Stone, 2004). One can argue that the concept re-gains importance through the emergence of studying the (intentional) structures of the will.

It is evident that agents following these principles of agency would never act incontinently. Nevertheless, Davidson still assumes that incontinent action is possible. The clue lies in the (c) part of the definition of incontinent action, which constitutes the *all-things-considered* phrasing.

For Davidson, agents have many individual *prima facie* reasons for action. All-things-considered judgments take all *prima facie* reasons into account, which balances reasons towards one course of action rather than another. When subsequently acting, agents create an *all-out* judgment on the basis of some collection of *prima facie* reasons. The continent agent then acts (*all-out*) on the basis of this all-things-considered judgment and thus takes the entire set of *prima facie* reasons into account—the incontinent agent acts (*all-out*) on the basis of one or more *prima facie* reasons, while ignoring the all-things-considered judgment.

Philebus might have a *prima facie* reason to watch television, but he may also have a *prima facie* reason to continue working and a *prima facie* reason to increase his discipline through working harder. All things considered, Philebus judges that it would be better to continue working. But instead, Philebus forms an *all-out* judgment on the basis of his *prima facie* judgment to watch television. He therefore acts against his better judgment that evening, and thus acts *akratically*.

B. Dichotomizing *Akrasia* and Weakness of Will.

Holton dichotomizes his definitions of weakness of will from *akrasia*—even though Davidson and the entire philosophical tradition before them considered these definitions equivalent (Holton, 2009b). Holton defines weakness of will as breaking one's resolution, while preserving the definition of *akrasia* as "acting against one's better judgment". As a result, there are instances of *akrasia* that are not weak-willed under Holton's definition, and *vice versa*.

One reason Holton considers his definition more useful than Davidson's definition of *akrasia*, is that agents often undergo judgment shifts.[22] Philebus' beliefs, desires *and* intentions can collectively change in favor of overeating, by which overeating might no longer be conceived

[22] Holton gives other reasons. Firstly, the definition of weakness of will can accommodate incommensurable options, as agents can just resolve to follow one option rather than another. Incommensurability between options is problematic for the notion of *akrasia.* Moreover, Holton contends that the definition can explain *strength of will* defined as sticking to one's resolutions—which was not possible for Davidson's traditional account, where self-control (and not strength of will) was the *default* mode. And lastly, weakness of will can even work in cases absent internal conflict (Holton, 2009b, 79-86).

as *akrasia*. To avert the problem of changing judgments, Holton's resolutions ought to govern agents over time—as second-order intentions, resolutions should even resist changes in judgments at the level of intentions. Resolutions are also easy to communicate, as agents communicate resolutions all the time. Communicating one's all-things-considered judgments under *akrasia*, with all the *prima facie* reasons that make them up, is quite troublesome – especially as all-things-considered judgments shift over time.

Suppose that Philebus forms a resolution to help a friend move next Saturday. But once Friday comes, Philebus' gets called by his boss. Philebus is called to work on Saturday, at the exact same time he resolved to help his friend. Philebus now judges, that *all things considered*, it would be best to visit his work instead of helping his friend – and works that Saturday. Philebus followed his all-things-considered judgment and does not act *akratically*, but nevertheless broke his resolution. Philebus is now in a state of weakness of will – and had he upheld his resolution – Philebus would have displayed strength of will.

Both Davidson's conception of *akrasia* and Holton's conception of weakness of will are nevertheless used in the remainder of this thesis, as both conceptions eventually demonstrate their merit in later sections.[23]

V. The *Real* Account of Self-Governance.

The previous sections (II-IV) have considered the *concepts* of structures of the will such as desires, beliefs, intentions, and conceptualized how agency can fail as *akrasia* and weakness of will. These sections did not yet consider the empirical reality of these concepts however, which will be called the *real* account. This *real* account entails that the aforementioned concepts can be understood as physical and biological phenomena that can naturalistically embed the structures of the will. The latter part of section V demonstrates how the *formal* account corresponds to and is translatable into the *real* account, and *vice versa*.

The *real* account is *pluralistic*, in the sense that both *akrasia* and/or weakness of will are *not*

[23] Folk-psychological accounts do not match aforementioned conceptions of weakness of will or *akrasia* (Mele, 2010; 2012; May & Holton, 2010). However, such folk-psychological accounts lack merit because of intrinsic contradictory biases. *Inter alia*, folk-psychological accounts were unlikely to consider agents' failure to act malevolently to be breakdowns of agency, while considering failures to act estimably as breakdowns of agency.

reducible to one *single* fundamental parameter inside the human body.[24] From the perspective of the *formal* account, one could straightforwardly envisage Philebus either acting in accordance with his resolution *qua* structures of the will, or breaking those resolutions instead. From the perspective of the *real* account, however, Philebus' brain can be biologically influenced in countless ways. Different neurotransmitters, hormones and general stress levels all determine whether Philebus acts in accordance with his resolutions. While the developed *real* account treats these different constructs such as neurotransmitters and hormones *in isolation*, these biological constructs are actually all interrelated.[25]

The goal of this section is to develop a comprehensive overview of how self-governance can be understood from an empirical perspective. Section seven will consequently connect several technologies and their side products to this *real* account.

A. Two Brain Systems.

Under the *real account*, failures of self-governance derive from 1) higher brain regions failing to control impulses of lower brain regions; 2) an over-activity of lower brain regions.[26] Failures of self-governance *may* thus ensue from higher brain capacities being weak, or from lower brain functions being (relatively) overpowering (Levy, 2010).

The consensus in Neuroscience is that two self-governance systems exist in the brain: the

[24] This notion of interrelation leads back to the proof by the likely abductive method mentioned in the introduction, instead of a proof by necessity.

[25] Empirical research maintains that intentions exhibit *psychological* influences on self-governance as well (Libet et al, 1983; Gollwitzer & Oettingen, 2011; Slors, 2013). Nevertheless, this thesis' later sections focus on more fundamental sciences such as physics or chemistry, as all technologies and their side products in section VII exhibit *physical* and/or *chemical* influences, which consequently affect human biology.

[26] The late 20th century *ego depletion* conception of weakness of will appears to have failed. This reductionist account held that *brain resources* for willpower are finite, and that agents would devolve to their habits under depleted willpower resources (Baumeister & Vohs, 2007; Baumeister, Bratslavsky, Muraven, Tice, 1998). Publication biases, non-standardized protocols, and non-replicable are the culprit to this conception (Hagger, Wood, Stiff, Chatzisarantis, 2010; Carter & McCullough, 2014; Inzlicht, Gervais, Berkman, 2016). This conception will therefore not be included in this thesis.

Type-I and Type-II system (Hoffmann, Friese & Strack, 2009).[27] The Type-I system controls behavior rapidly and automatically, thereby using subconscious reasoning—the Type-II system is conscious and controlled instead, using deliberate reasoning, and reacts slowly. That Type-II system *can* regulate the Type-I system, *iff* the Type-I system is not overpowering, and *iff* the Type-II system has ample strength.

The Type-I system is evolutionarily older and mostly located in the sub-cortical regions of the limbic system, including the thalamus, hypothalamus, hippocampus and amygdala. This Type-I system nevertheless includes *some* higher brain regions around the temporal and the ventromedial prefrontal cortices (VMPFC) as well, and this system mainly controls pleasure, motivation, long term memory, reward and emotion (Bechara, 2005; Corbetta & Shulman, 2002; Daw, Niv & Dyan, 2005).

The higher brain functions associated with the Type-II system are evolutionarily more recent. The *locus* of the Type-II system is found around the prefrontal cortex (PFC) and anterior cingulate cortex (ACC) (Posner & Rothbard, 2009).[28] This system not only self-governs behavior by *inhibiting impulses*, but also controls distal motivations over proximal ones through *planning* (Fujita, 2011; Diamond, 2013). Both systems thus minutely coincide around the PFC, specifically in the VMPFC—but their overall locations are very different.

B. The Prefrontal Cortex and Self-Governance.

Let us now locate the Type-II system in higher brain regions, such as the PFC. The PFC is neuroanatomically uniquely interconnected to alternative cortical areas and evolutionary lower regions. PFC damage commonly results in major self-governance problems, including inabilities to follow social conventions, properly conducting social interactions, problems inhibiting impulses, and troubles controlling emotions (Miller & Cohen, 2001; Carmichael & Price, 1995). Such problems are related to the PFC's role regarding abstract rules for action, and its role in prioritizing actions (Badre, Kayser & D'Esposito, 2010; Coutlee & Huettel, 2012). The PFC is also highly involved in *planning*, and can be subdivided into different regions.

The aforementioned social behavior is mainly governed by the VMPFC (Bechara, Tranel &

[27] This "dual-process theory" originated from Jean Piaget (1928/2002). For modern discussions, see: (Evans, 2003; Osman, 2005; Kruglanski & Gigerenzer, 2011; Kruglanski, 2013; Evans & Stanovich, 2013; Varga & Hamburger, 2014).

[28] One might also include the parietal cortex, but it is of lesser import to the current thesis.

Damasio, 2000; Beer, Shimamura, & Knight, 2004). The VMPFC additionally governs desires, by regulating motivational and reward processes (Barbas, Saha, Rempel-Clower, & Ghashghaei, 2003; Barbas, Saha, Rempel-Clower, & Ghashghaei, 2003). An example is inhibiting fear while promoting courage (Haber, 1995; Nili, Goldberg, Weizman & Dudai, 2010).

Compared to the VMPFC, the lateral prefrontal cortex (LPFC) has poorer connectivity to lower brain regions. While the LPFC aids in planning (Petrides & Pandya, 1999; Stuss & Alexander, 2007), it mainly regulates motivation emerging in lower brain areas by acting as a "brake" on such impulses (Nambu, 2008; Aron, Robbins, & Poldrack, 2014).

Lastly, the anterior cingulate cortex (ACC) is the PFC region that lies closest to the evolutionary older brain regions and is highly interconnected therewith. The ACC regulates reward and motivation (Ongur, An, & Price, 1998; Vogt & Pandya, 1987), and the ACC can also inhibit emotions while promoting goal-directed behavior (Tanji & Hoshi, 2008; Allman et al, 2001; Cohen, Kaplan, Moser, Jenkins, & Wilkinson, 1999). The ACC can specifically signal for more rational control, due to its interconnection between the PFC and lower brain regions (Botvinick, Braver, Barch, Carter, & Cohen, 2001). Finally, the ACC contributes to *coherence* in plans (Carter et al., 1998; Gehring & Knight, 2000).

C. Failures of Self-Governance.

One way to understand self-governance and thus the Type-I and II systems is to envision how self-governance *fails*. Let us therefore consider several examples such as addiction.

Current models of addiction *do not* reduce addiction exclusively to biological determinants, as psychological factors[29] and prospects of flourishing[30] play essential roles as well. Nevertheless, addictions certainly have quintessential biological bases (Ross, Sharp, Vuchinich & Spurrett, 2008). Feelings of stress can create craving states in addicts that are not present in non-

[29] *When asked*, addicts prefer larger-later rewards rather than a smaller-sooner rewards. Addicts often *reverse* their initial judgment however, when given the actual opportunity for smaller-sooner rewards (Monterosso & Ainslie, 2006; Ainslie, 2013). "Choice bundling" by imagining taking the smaller-sooner reward *ad infinitum*, can be used as a tool to create a disposition towards larger-later rewards (Kirby & Guastello, 2001).

[30] Many live in such excruciating circumstances that they no longer care about larger-later rewards when having the chance for smaller-sooner ones (Kennett, 2013). However, one might doubt whether the poor *really* believe that they have no future at all (Levy, 2013). It can nevertheless be argued that poor people without an outlook in life are more *prone* to prefer smaller-rewards sooner rather than larger-later rewards.

addicted individuals (Sinha, 2008). Additionally, addicts usually have strong *desires* towards a substance or activity, that does not result in proportional levels of *pleasure* when that desire is fulfilled (Berridge, 2007; Holton & Berridge, 2013). Such desires in addicts emerge from dysregulated dopamine structures in sub-cortical regions the brain.[31] These strong desires can subsequently be located in the Type-I system, and addictions can be conceptualized as an *overpowering* of the Type-II system by that Type-I system.

Mood is also related to failures of self-governance. Otherwise orderly behaving individuals are far more likely to partake in risky behavior during bad moods – bad moods increase propensities for aggression, engaging in dangerous sexual behavior, overeating, and smoking behavior in smokers (Anderson & Bushman, 2002; Macht, 2008; Bousman, Cherner & Ake, 2009; McKee, Sinha & Weinberger, 2011). Such bad moods can thus be understood as a temporary overactive Type-I system.

Adolescents on the contrary, often fail in their self-governance due to rudimentary Type-II system developments (Pokhrel et al., 2013; Schulman et al., 2016). Come adolescence, executive functions such as reasoning capacity and working memory are usually fully developed, while impulse control and planning have not.[32] Reward seeking behavior therefore peaks during early adolescence while impulse control only fully develops with maturity.

D. Neurotransmitters and Self-Governance.

Let us now consider different neurotransmitters and their role in self-governance, which are 1) dopamine; 2) epinephrine and its interrelated norepinephrine and 3) serotonin. Other important neurotransmitters such as acetylcholine and GABA have not been included because of the scope of the argument. When the argument denotes "healthy" or "correct" levels of neurotransmitters, such levels are understood as healthy or correct from the perspective of *self-governance*.

Firstly, dopamine is the neurotransmitter of *reactivity* towards environmental stimuli. Dopamine regulates reward signaling in the brain (Schultz, 2010) and thereby prioritizes and re-prioritizes different behaviors (Floresco, Onge, Ghods-Sharifi, & Winstanley, 2008; Hazy, Frank, & O'Reilly, 2009; Luciana, Wahlstrom, Porter & Collins, 2012). Dopamine consequently

[31] Addiction and the loss of self-governance nevertheless involve a *plurality* of neurotransmitters (Koob & Le Moal 1997; 2008; Volkow, Fowler, Wang, Baler & Telang, 2008).

[32] There might be cultural differences *qua* "adolescents" developments between "the West" and other cultures.

promotes seeking the unfamiliar in an environment, as well as bolstering aversions against negative stimuli (Zald et al., 2008; Salamone, 1994). The dopamine system increases wakefulness to promote its reward-seeking behavior and mediates between lower, middle and higher brain regions (Montague & Berns, 2002; Dzirasa et al., 2006). In doing so, dopamine can eventually reinforce certain behaviors while disinhibiting motivation towards others. Dopamine does have an optimal level—depressed dopamine levels are associated with anxiety, depression and apathy, while excessive dopamine levels are related to problematic impulse control and overstimulation (Sierra et al., 2015).

Epinephrine (adrenaline) and norepinephrine, secondly, are chiefly associated with "fight and flight" responses. Epinephrine and norepinephrine incite (momentary) proactive action, in contrast to dopamine's explorative reactivity, that is accompanied by increasing heart rates and arousal levels – creating a tunnel-vision towards initial stimuli.[33] In promoting proactive action, epinephrine and norepinephrine also facilitate decision-making processes (Wortsman, 2002).

Such proactive actions can have negative long-term consequences through – both epinephrine and norepinephrine are associated with both decisive action *and* aggression (Haller, Makara, & Kruk, 1998). On the one hand, decisive actions can be equated to assertiveness, and often exemplify self-confidence (Tse & Bond, 2003; 2006)—but elevated levels of epinephrine promote aggression when relaxing neurotransmitters including serotonin are low (Mawson, 1999).

Chronically elevated epinephrine and norepinephrine cause anxiety and restlessness.[34] Even everyday life stressors can be responsible for such increases in epinephrine and norepinephrine levels (Goldstein, 2010). Depressed levels of epinephrine, however, are equally problematic, leading to chronic fatigue.

Let us lastly consider serotonin. Optimal serotonin levels not only promote a state of well-being *qua* mind and mood—depressed serotonin levels are linked to impulsive behavior such as aggression or addiction, and are *explicitly* linked to a predominance of the Type-I system over the

[33] The *proactive* effects of epinephrine can be contrasted with dopamine's *reactive* effect (Tops, Boksem, Luu, & Tucker, 2010). From an evolutionary perspective, proactivity and reactivity are valuable in different circumstances (Cohen, McClure, & Yu, 2007).

[34] In some pathologies, continuously elevated epinephrine levels cause chronic over-arousal, an inability to relax and re-accessing of negative memory states (Henry, 1993).

Type-II system (Carver, Johnson, & Joormann, 2008).[35] Depressed serotonin levels consequently lower impulse control regarding negative emotions arising from the amygdala, such as anxiety, or lead to decreased harm avoidance (Hansenne & Ansseau, 1999; Bjork, Dougherty, Moeller, & Swann, 2000). Moreover, depressed serotonin levels also create adversities towards win-win situations, while simultaneously promoting conflict-related social behavior (Knutson et al., 1998).

Optimal serotonin levels promote opposite effects, increasing self-confidence *and* cooperation between individuals (Tse & Bond, 2002).[36] Additionally, optimal serotonin levels aid in controlling "useless" impulses, and augmenting the ability to take actions in the absence of motivation towards that action (Murphy, Smith, Cowen, Robbins, & Sahakian, 2002, Walderhaug et al., 2002; Cools et al., 2005; Carver, Johnson, & Joormann, 2008).

E. Hormones and Self-Governance.

Next to neurotransmitters, hormones also affect self-governance. Let us first consider the hormones cortisol and testosterone. Both testosterone *and* cortisol exhibit an extensive role in both impulsive aggression as well as planned and calculated aggressive behavior (Montoya, Terburg, Bos, & van Honk, 2012). Precisely the combination of *high* testosterone and *low* cortisol levels outstandingly predict aggression (Dabbs, Jurkovic, & Frady, 1991).[37]

When studied in isolation, elevated cortisol levels are related to fear-based responses and heightened stress levels (Hannibal & Bishop, 2014). Such chronically elevated stress levels often complement anxiety and depression (Singh et al., 2012). Depressed cortisol levels additionally decrease the PFC's ability to regulate behavior (Mizoguchi, Ishige, Takeda, Aburada, & Tabira, 2004) Either insufficient or excessive cortisol levels also heighten activities of emotional brain

[35] Inabilities to produce *or* use serotonin directly leads to symptoms of depression (Smith, Morris, Friston, Cowen, & Dolan, 2000; Parsey et al., 2006). Individuals with depressed serotonin levels exhibit both an over-activity of the emotional lower parts of the brain and an under-activity around the PFC (Dolan, Bench, Brown, Scott, & Frackowiak, 1994; Kennedy et al., 2001; Drevets et al., 2002).

[36] There might be neurotransmitter interactions between the brain and other parts of the human body—such as the vital role of gut bacteria in the creation of serotonin (Bornstein, 2012; O'Mahony, Clarke, Borre, Dinan, & Cryan, 2014). Due to the scope of the argument, *solely* biological processes in the brain will be considered.

[37] Planned and calculated aggression are additionally propagated by *low* serotonin levels (van Honk, Harmon-Jones, Morgan, & Schutter, 2010).

areas such as the amygdala (Erickson, Drevets, & Schulkin, 2003). Combining elevated cortisol levels with elevated epinephrine and norepinephrine additionally decreases executive functions such as planning or impulse control (Arnsten & Li, 2005).

Secondly, optimal testosterone levels increase impulse control and PFC activity (Volman, Toni, Verhagen, & Roelofs, 2011). Optimal testosterone levels are essential for mental well-being and *avoiding* behavioral pathologies (Spitzer et al., 2013; Ciocca et al., 2016). Higher testosterone levels in adult men precisely curtails propensities for anxiety and depression (McHenry, Carrier, Hull, & Kabbaj, 2013).[38] Higher testosterone levels in both sexes, however, also cause them to take more risks (Stanton, Liening, & Schultheiss, 2010; Mehta, Welker, Zilioli, & Carré, 2015). This is especially true in situations where outcomes are unpredictable (Goudriaan et al., 2010).

Interestingly enough, testosterone levels have been on the decline in men for a few decades (Travison, Araujo, O'Donnell, Kupelian, & McKinlay, 2007; Ahern & Wu, 2015). For women, this effect is currently untested. While women have far lower testosterone levels compared with men, women nevertheless need testosterone to function properly as well (Davis & Wahlin-Jacobsen, 2015). Women need testosterone amongst others for energy, well-being, cognitive functioning and libido. *Qua* neurotransmitters, higher testosterone levels are associated with *lower* epinephrine levels (Elman, Goldstein, Adler, Shoaf & Breier, 2001). Optimal testosterone levels might thus lower stress while improving outlooks on life.

Lastly, estrogen also affects self-governance as a hormone. Excessive estrogen levels decrease testosterone levels in both men and women (Mazer, 2002; Rambhatla, Mills & Rajfer, 2016). Estrogen generally assumes a higher value in women than men, especially during some parts of the menstrual cycle. Estrogen strongly influences the functionality of different neurotransmitters in the brain, cognitive functioning, mood, pain mechanisms and the modulation of behavior (Chakraborti, Gulati, & Ray, 2007). For example, depressed estrogen levels decrease serotonin and dopamine (Joffe & Cohen, 1998; Amin, Canli, & Epperson, 2005; Jacobs & D'Esposito, 2011). Excessive estrogen levels on the other hand, increase impulsive behavior (Smith, Sierra, Oppler & Boettinger, 2014).

[38] In adolescent boys however, elevated testosterone levels are associated with decreased control over one's amygdala, but this effect is not present in adults (Peters, Jolles, Duijvenvoorde, Crone, & Peper, 2015).

F. Stress.

Stress is defined as environmental stimuli affecting organism's homeostatic capacity. While modest stressors *can* be constructive, countless individuals experience deleterious (continuous) stress levels nowadays – stress is linked to the six leading causes of deaths on a worldwide basis, and affects 43% of adults in the West (APA, 2017).

Acute stress may double or even quintuple cortisol levels, while increasing epinephrine levels and dopamine levels, examples are dentist visits or public speaking (Finlay & Zigmond, 1997; Wortsman, 2002; Hargreaves, 1991). But acute stress also decreases top-down PFC control on lower brain regions (Arnsten, Mazure & Sinha, 2012). Acute stress' short-term increases of proactivity and reactivity essentially come at the cost of well-being, and control is shifted from evolutionary newer brain regions to older regions, *especially* over time (Arnsten, Mazure & Sinha, 2012).

Chronically elevated stress lowers the capacity to successfully use serotonin in the brain (Arnsten, 2009; Mahar, Bambico, Mechawar & Nobrega, 2014). Chronic stress even decreases the grey area volume of certain brain areas, such as the hippocampus, anterior cingulate region and the PFC (Papagni et al., 2011; Ansell, Rando, Tuit, Guarnaccia & Sinha, 2012). Most lower brain areas are not affected *qua* volume—but areas such as the amygdala can nevertheless become overactive and generate continuous negative emotions such as fear (McNally, 2006).

Excessive stress levels are inversely correlated with having a strong connection between the PFC and amygdala (Kim & Whalen, 2009). This results in shorter attention spans, decreased abilities to inhibit impulses, and a decline in higher-brain functioning such as planning (Alexander, Hillier, Smith, Tivarus & Beversdorf, 2007; Liston, McEwen & Casey, 2009; Li & Sinha, 2008).

M. The Type-I and Type-II conception of Agency.

The quintessential inference from the previous subsections is that the *formal* account represented by the structures of the will (sections II-IV) can be translated to the *real* account developed in this section.

Both planning capacity, intentions and impulse control are located in the PFC and its surrounding neuroanatomical formations as the *locus* of the Type-II system. *Intentional* structures of the will and their derivatives such as *plans* or *policies* are then physically realized in areas

around the PFC. [39] *Beliefs* and *desires*, as structures of the will, are realized mostly within subcortical regions of the Type-I system.

The definitions of possible failures of agency presented in section IV can also be translated to the *real* definition. Davidson's *akrasia* then consists in acting on the basis of the Type-I system while the Type-II system idly stands by. The PFC organizes reasons for action, but cannot govern under a weakened Type-II system *or* overpowering Type-I system. Holton's weakness of will on the other hand, consists of the Type-II system setting resolutions. Such a resolution might can be considered an abstract rule from the perspective of the *real* account. These resolutions are consequently broken by impulses originating within the Type-I system.

VI. Structures of the Will and Ethical Theories.

This section considers the conceptions of agency and *akrasia* and/or weakness of will developed by Aristotelean Eudaimonism and Kantian Deontology. Their conceptions of agency and *akrasia* and/or weakness of will are subsequently related to the structures of the will. These aforementioned ethical theories then allow for *normatively* assessing the self-governance effects of environmental technologies in section VII.

A. Aristotle's Virtue Ethics

Let us first consider Aristotelean Virtue ethics. The introduction already disclosed Aristotle's conception of agents *acting against their better judgment* in *akrasia*. *Akrasia* can make it harder or impossible to reach the final goal of a successful life called *Eudaimonia* [εὐδαιμονία] (*EN*, 1097b1-3) – so while virtues are necessary preconditions for achieving *Eudaimonia*, virtue and *akrasia* are mutually exclusive.

In virtuous and *enkratic* agents, the higher rational part of the soul [ψυχή] controls and informs the lower parts. Aristotle distinguishes between different parts of the soul, 1) vegetative; 2) animalic; 3) rational (*EN*, 1102a-1103a). *Prima facie*, the rational part appears to be the only rational part of the soul. The animalic part *can* nevertheless participate in reason as well, but exclusively under guidance of the rational part.

The vegetative and animalic parts of the soul are appetitive and desiring, but agents do not

[39] Neuroscience generally considers *planning* and *impulse control* (intentions) two different executive functions—Bratman's planning theory of the will on the other hand, derives plans *from* intentions.

have to act on these lower desires [ὄρεξις] *per se*.[40] The different desires are *epithumia* [ἐπιθυμία], corresponding to the lowest part of the soul, *thumos* [θυμός] in the middle part, and *boulêsis* [βούλησις], interrelated with the highest rational part of the soul. The highest rational part therefore *desires* that which is rational.[41]

Contrary to inorganic matter, human agents can develop virtue because they *can* be habituated (*EN*, 1103a). Virtues [ἀρετή] are teachable through continuous excellent action, culminating in *stable* virtuous characters (*EN*, 1099b-1100a). In developing virtue, the higher rational part of the soul also continually conditions the lower parts towards virtue—the lowest parts thus become harmonious with reason.

In developing virtuous characters, Aristotelean agents need to *intentionally* choose virtuous over vicious actions. Aristotle considers both virtuous *and* vicious action deliberate. Children and animals allegedly do not deliberate, and therefore necessarily act from their vegetative and animalic parts of the soul – incapacitating their possibility of attaining virtuous characters. Moreover, virtuous action should be chosen for its *own sake*—and virtuous action should only be chosen from a *stable disposition* (*EN*, 1105a-1105b). Both virtuous and vicious actions originate from stable dispositions—whereby vicious action *aims* at the wrong things, while *virtuous* action aims at the right things. Agents with virtuous characters thus act deliberately, choose virtuous actions for their own sake and act from stable dispositions. Virtuous agents even feel pleasure when acting virtuously, although pleasure is not the *final end* of virtuous action—as otherwise Aristotle's theory would have regressed into a hedonic theory (*EN*, 1104b2-4).

B. Aristotle's Conception of Weakness of Will.

Next to the deliberate virtue and vice, Aristotle also defines *akrasia* and *enkrateia* [ἐγκράτεια] (*EN*, 1146a-1151a). The key here are passions—both *akratic* and *enkratic* agents have passions [πάθη] opposing reason—but while feelings subjugate reason in the *akratic* agent, the opposite is true in the *enkratic* agent. Aristotle's conception of *akrasia* clearly exhibits a conflict between rational desire [*boulêsis*/βούλησις] on the one hand, and lower passions [πάθη] or desires [ὄρεξις] on the other hand. Luckily, true deliberative volition can act *contrary* to the lowest desire

[40] "Passions" [πάθη] are not translated as emotion, as the modern term "emotions" was only invented during the 16th century. Aristotle differentiates between different types of desires [ἀρετή], mediated by the imagination (Pearson, 2012), which ground his conception of passions.

[41] Intelligence is not the final cause, but has to be *paired* with a desire to produce rational action.

[*epithumia*/ἐπιθυμία] (*EN*, 1111b-1113a).

An *akratic* Philebus might think that all-things-considered, it would be best not to drink more wine, but nevertheless continues drinking—sometimes absent deliberation. An *enkratic* Philebus *sticks* to his is all-things-considered judgment, despite having strong desires of drinking more wine.[42] In essence, Aristotle's conception of *akrasia* is remarkably similar to Davidson's conception, in that agents do not act upon *the full set* of reasons for action.[43] Remember that Davidson argued that the *akratic* person acts all-out on a subset of *prima facie* reasons, while ignoring the full set of *prima facie* reasons making up an all-things-considered judgment. In Aristotle, *akratic* agents not do act on what their *full* reasoning capacity concluded—even though *akratic* agents might have their reasoning capacity intact.

Aristotle's understanding of *akrasia* relies on his conception of practical reason, which in turn relies his understanding of (practical) syllogisms. When conceived under a syllogism of practical reason, virtuous, *akratic* and *enkratic* agents all agree on the major premise of that syllogism. That major premise might read "smoking should be avoided for health reasons". The virtuous, *akratic* and *enkratic* agents likewise agree on the minor premise, which expresses "this is a cigarette". All agents should thus inevitably conclude not to smoke, and follow through on that with action.

The virtuous agent straightforwardly completes this syllogism and acts thereupon—this agent has no conflicting *epithumai*. The *enkratic* agent has *epithumai* to smoke cigarettes in the form of an *additional* minor premise that is not found in the original practical syllogism, but nevertheless follows through on that *original* syllogism. The *akrates* on the other hand, "forgets" the major premise *or* the entire original syllogism, thereby not taking all his reasons into

[42] One can distinguish even more Aristotelean categories of *akrasia*, but doing so will not contribute to the argument of this thesis (Henry, 2002; Kraut, 2014).

[43] These conceptions are similar because Davidson attempts to explain *akrasia* within an Aristotelean framework.

account—and acts on *epithumai* symbolized by the additional minor premise (*DA*, 433a1–3).[44,45]

Agents do not always yield to strong feelings under *akrasia*, but can also yield to weak forms of *pathos*.[46] There are also soft agents, who succumb to weak desires which are otherwise easily controlled by others (*EN*, 1150a9-b16). When Philebus fails to build good habits during his youth, even weak temptations become too strong to resist.

C. Aristotle's Conception of Agency Translated to Structures of the Will.

Aristotle's agents can act contrarily to their lowest desires [*epithumia*/ἐπιθυμία], exemplified by the *enkratic* agent. But Aristotle also repeatedly states "that which originates movement must specifically be one", entailing that agents are exclusively *moved by* one or another *desire* (*DA*, 433b). Nevertheless, because the highest "desire" [*boulêsis*/βούλησις] fully accords to reason, an *intentional* structure of the will is nevertheless attributable to Aristotle's ethics. Agents can precisely act on higher impulses that counter their lower impulses. Rational desires [*boulêsis*/βούλησις] might thus conflict with the desires of the lower part of the soul (*DA*, 434a12–13), or be at odds with the appetitive middle part of the soul (*DA*, 433b6–7).

Prima facie, rational desires [*boulêsis*/βούλησις] would seem to be interpretable as *both* Frankfurt's second-order desires or Bratman's intentions. However, this thesis contends that rational desires can solely be interpreted as Bratman's intentions. Firstly, Frankfurt's second-order desires can never be *causative*, while Aristotle's rational desires [*boulêsis*/βούλησις] and Bratman's intentions can. Frankfurt contends that agents are moved by what they love, which

[44] Aristotle develops an alternative conception of *akrasia*, consisting of a conflict between two desires (*DA*, 434a12-15). In his *EN* however, Aristotle moves closer to Socrates' moral intellectual conception of *akrasia* but does not fully accept it. The key are the *different senses* in which an Aristotelean *akrates* can have knowledge. The *akrates* might *know* that a certain action is all-things-considered not the best, contained in the universal knowledge of the major premise. But the *akrates* acts upon particular knowledge of minor premises instead of a major premise (Desireé, 2007). The Aristotelean *akratic* acts on his *epithumai*, because the "imagination" [φαντασία/*phantasia*] never presents the good of *boulêsis* to the agent (Destrée, 2007). "Imagination" is an often-used translation of *phantasia* but might not be fully correct (Pearson, 2012, 57). For simplicity purposes, the term imagination remains used.

[45] The vicious agent [*akolastos*/ἀκόλαστος] never forms the major premise that "smoking is bad for health reasons". A vicious Philebus might have a major premise of "smoking leads to pleasure", thereby never knowing the good. There is subsequently no conflict in the *akolastos*.

[46] Aristotle ascribes an archetypal softness to some cultures, and some persons (*EN*, 1150b).

exclusively emerges from the lowest desires—while Frankfurt simultaneously maintains that second-order desires, reflective capacities and agents' identification can never be *causative* towards action.

Secondly, Aristotle's rational desires [*boulêsis*/βούλησις] can act *contrarily to* lower desires [*epithumia*/ἐπιθυμία & *thumos*/θυμός][47], just as Bratman's intentions can. Within Frankfurt's conception of agency, however, agents can never act contrarily to lower impulses envisioned as desires. Hence, desires *qua* structures of the will can be identified with Aristotle's desiring and appetitive parts of the will, while intentions *qua* structures of the will can be identified with rational desires [*boulêsis*/βούλησις].

Moreover, the intellectual virtue of *phronesis* can denote *policies* as structure of the will, because *phronesis* gives a general guidance in the self-governance by other *moral* virtues.[48] Intellectual virtues like *phronesis* [φρόνησις], which can be translated to "practical wisdom", denotes the ability to intellectually grasp judgments relating to action *in general* (*EN*, 1140a-1141a). Additionally, *phronesis* also exhibits features of the *planning* structure of the will, as *phronesis* guides Aristotelean agents towards *Eudaimonia* over time. Under *phronesis*, agents thus *plan* how to achieve virtue over time, or deliberate how their intentions should be unfolded over time.[49] Sadly enough, there is no identifiable equal to resolutions *qua* structure in the will in Aristotle.

For summarization purposes, a schematic display of the translation of the Aristotelean conception of agency to the different structures of the will has been included in Appendix II. After outlining Aristotle's conception of agency, let us consider where Aristotle differs from Kant. Kant's conception of agency will be related to the *formal* account of self-governance as well.

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[47] See: (Zigano, 2007, 170-172).

[48] Aristotle distinguishes between *moral* and *intellectual* virtues. Moral virtues are governed by a golden mean, while intellectual virtues should be pursued without limit. Examples of moral virtues are courage or attitudes towards pleasure. Courage expresses a golden mean situated between cowardice and overconfidence and/or fearlessness (*EN*, 1115a-1118a)—and temperance denotes the golden mean situated between overindulgence and anesthesia and/or insensibility (*EN*, 1117b-1120a).

[49] The imagination [φαντασία/*phantasia*] contributes thereto as well.

D. Kant's Deontological Ethics *Contra* Eudaimonism.

Kant maintains that there is nothing good without qualification, except the good will (*G*, 4:393). Virtuous agents who act according to this good will achieve a state of happiness, "in which virtue is its own reward" (*MS*, 6:377). However, Kant distinguishes between two forms of happiness: *sensible* happiness and *moral* happiness. Moral happiness proceeds from agents acting according to the *Moral Law*, and sensible happiness ensues when agents fulfill the objects of their inclination [*Neigung*] (*MS*, 6:387).

The first formulation of that Moral Law reads "act only in accordance with that maxim through which you can at the same time will that it become a universal law" [50], and Kant holds that the unlimited pursuit of one's own sensible happiness contradicts that Moral Law (*G*, 4:421). Sensible happiness can be equated the pursuit of pleasure and avoidance of pain, while moral happiness originates from the contentment of fulfilling one's duty (*KpV*, 5:38; 5:88; 5:117). Virtuous agents are therefore rewarded with *moral* happiness, and cannot pursue their *own* sensible happiness to an *unlimited* degree (*MS*, 6:386; *G*, 4:415).[51]

Kant assumes that Moral Law is contradicted by *Eudaimonism*, due to Eudaimonism's unlimited pursuit of sensible happiness[52], and does not see any possibility of grounding morality on Eudaimonism—going as far as stating that Eudaimonism commits *euthanasia* upon morality (*MS*, 6:377-378). Eudaimonism impedes true beneficence for Kant, precisely because pursuing one's *own* happiness contradicts Kant's *unlimited* duty to promote the sensible happiness of *others* (*MS*, 6:380-385; 6:452; 6:457, *G*, 4:395). Kant does nevertheless not favor asceticism for virtuous agents (*MS*, 6: 485)—agents *must* instead pursue sensible happiness to a *limited* degree to *avoid* henceforth breaking the Moral Law (*G*, 4:427; *KpV*, 5:93; *MS*, 6:388).

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[50] The Moral Law (Categorical Imperative) has multiple formulations, including the humanity, autonomy and Kingdom of ends formulations (*G*, 4:429; 4:431; 4:439). These formulations are nevertheless considered different *formulations* of *one supreme principle* (*G*, 4:431; 4:435).

[51] Kant also criticizes Eudaimonism because it is based on a *sensible* principle (*MS*, 6:377-378). According to Kant, Eudaimonism *presupposes* that actions bring happiness, so that happiness is an *end-in-itself*. But Eudaimonism also presupposes that happiness is achieved when one's duty is fulfilled, so that duty also (or virtue) becomes an *end-in-itself*. Kant's distinction between different types of happiness aims to solve this "contradiction" (*KpV*, 5:21-27; Wood, 2000).

[52] Or one's own successful life.

E. Kant's Conception of Self-Governance.

Kant quintessentially dichotomizes human agents into a *phenomenal* and a *noumenal* self (*G*, 4:457-4:458). This dichotomy within agents is tied to two aforementioned conceptions of happiness—sensible happiness belongs to the phenomenal self in "the world of sense, under laws of nature" while moral happiness belongs to the noumenal self of "the intelligible world, under laws that, independent of nature, are not empirical but have their foundation merely in reason" (*G*, 4:452; *KrV*, B294-B315).[53] Inclinations are thus situated in the phenomenal world, whereas the freedom to act according to duty resides in the noumenal world.

Agents act upon certain *maxims*, which are *subjective principles* of action (*KpV*, 5:27; *MS*, 6:401). Rational beings, as noumenal selves, have "the capacity to act according to the representation of laws, *i.e.* according to principles, or a will" (*G*, 4:412). Acting on maxims that consider the duties expressed by the Moral Law as their primary incentive are considered moral, while acting on maxims that are primarily based upon inclinations are considered immoral (*G*, 4:408). Hence, inclinations may never play the *primary role qua* incentives for action (*G*, 4:390; 4:402).[54]

Agents ought to mount a never-ending struggle against their inclinations so that their actions may have duty as their highest incentive for action—agents therefore acquire a *duty of apathy* to master themselves (*MS*, 6:408). This duty of apathy demands that inclinations should never overpower one's capacity for rational action.[55] As a corollary, agents obtain a duty to cultivate capacities that allow them to conform to the Moral Law.[56] Kant even equates *all* inclinations with some sort of "mental disorder", because they limit the ability by which an agent can be governed

[53] To this day, Kant's two world theory is subject of discussion (Wood, 1984; Kohl, 2016). The issue is whether the noumenal world is just a *practical standpoint* or whether it has *theoretical* metaphysical presuppositions including a libertarian free will.

[54] From a phenomenal perspective, it is impossible to observe whether other agents acted morally, and thus impossible to locate whether the primary incentive of an action was based in duty (Kant, 1785/1993, 4:407). Agents sometimes act *in accordance with* the Moral Law without duty being the *primary* incentive.

[55] As a point of interest of this thesis, Kant identifies some classical conceptions of the loss of self-governance that are opposed to duty—vices are murdering oneself, "unnatural use" of "sexual inclinations" and "excessive consumption of food and drink", which all weaken agents' purposive powers and therefore their wills (*MS*, 6:420).

[56] The duty of apathy is related to the duty of achieving one's own perfection. One's own perfection denotes the ability to follow the Moral Law, and is considered an unlimited (*perfect*) duty (*MS*, 6:387; 6:446).

by reason alone (*A*, 7:251). However, agents *can* and *may* never rid themselves of inclinations either (*R*, 6:58).[57] Inclinations must thus be managed.

Kant distinguishes between different types of inclinations which agents struggle against, such as more heated inclinations which are called affects, including rage—and colder dispositions called passions [*Leidenschaft*], which includes the calculated pursuit of revenge (*A*, 7:252). Agents must *rule* themselves in relation to these violent affects, and *govern* themselves in relation to their colder passions (*R*, 6:407). Opposed to Aristotle's virtuous agents then, Kantian agents never achieve a fully settled virtuous *dispositions*. Philebus' presently mild inclinations might become tomorrow's mortal enemies. Kant consequently considers an "*autocracy* of practical reason", or total mastery of the will, merely an elusive ideal (*MS*, 6: 383; 6:409)—but an ideal that agents should nevertheless strive for.

To increase self-governance, agents should not cultivate *conflicting* feelings with the Moral Law—they should cultivate sympathy for other rational beings instead, to promote their ability to henceforth follow the Moral Law (*MS*, 6: 383; 6: 456–467). While sympathies in the form of inclinations are prone to err, properly governing them can nonetheless help agents follow the Moral Law (*A*, 7: 144). Sympathy can thus help agents combat affects and passions over time. Additionally, physical and moral health should be cultivated as well. While physically, "health consists in the balance of all man's bodily forces", moral health consists in the strength to subdue passions and affects (*MS*, 6:384; 6: 409). Without physical and mental health, agents are more prone to regress in immoral behavior henceforth.

F. Kant's Conception of Weakness of Will.

Kant defines virtue as the "strength of a human being's will in fulfilling his duty" (*MS*, 6:405). A will can thus literally be strong or weak. Virtue, as unconditionally good, is tightly interconnected with the "good will" that is good without qualification (*KpV*, 5:110–111; 5:229).[58] As such, moral actions that overcome *strong* inclinations have greater moral merit compared to moral actions that overcome *weak* inclinations (*G*, 4:397)—overcoming stronger inclinations expresses

[57] There are different interpretations of Kant's attitude towards the inclinations. This thesis will follow the interpretation that Kant does not favor extirpation, silencing, or suppression. See (Formosa, 2011; Baxley 2007; 2010, 61-67). Instead, inclinations have to be cultivated towards reason while bad inclinations are "contained".

[58] Nevertheless, Kant does separate *virtue* and the *good will*, thereby contending that they are not the same thing (Baxley, 2010, 46).

greater virtue.[59] Kant's conception of virtue runs counter to Aristotle's conception of virtue, where desire [*epithumia* ἐπιθυμία] and appetite [*thumos*/θυμός] necessarily harmonize with and obey reason (*EN*, 1102b).[60] Not having to overcome desires at all thus denotes greater virtue for Aristotle.

The compatibilist reading of Kant regards an agent's autonomy not as being free from *external* causes, but creating their own laws instead. Referring to the Greek conception of autonomy [αὐτόνομος], wherein auto [αὐτό] means "self" and nomos [νομος] denotes "law", Kantian autonomous agents can thus be considered *self-law-giving*. Agent's wills must necessarily act under "under the Idea" of being free to be autonomous—*i.e.*, agents must understand their will *as if* it were responsive to reasons (*G*, 4:448). While establishing whether the will is metaphysically free or causally determined is impossible, freedom is *conceivable* in principle (*KrV*, A444/B472-A452/B480). This *conceivability* of freedom becomes the necessary precondition for exercising the will from the standpoint of practical reason.[61] Agents who thus can act on a "representation of a law" of their own creation can be considered fully free, even under compatibilist interpretations of Kant.

Kant's conception of *akrasia* [ἀκρασία] (or weakness of will) consists in being tempted by the propensity for evil *and* also succumbing. Continence on the other hand, also involves temptation but is accompanied by virtue to resist the propensity for evil. Lastly, full-fledged virtue consists of not being tempted at all—or in cheerfully executing one's duty due to strong virtue—but such dispositions never last forever for Kantian agents. Contrary to Aristotle then, Kantian agents can only exhibit an *autonomy* of the will without achieving full *autocracy*.

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[59] Kant's contemporaries mistakenly interpreted Kant's ethics as denying that full moral development required the development of the sensibilities (desires; inclinations) in accordance with reason. See: (Schiller, 1793/2005).

[60] Modern authors defending virtue ethics also criticize Kant's conception of virtue. See: (Annas, 1995, 53; Hursthouse, 2002, 101-105).

[61] From the perspective of Kant's practical standpoint, willing action α presupposes agents envisioning being the free cause of α. Agents thus become autonomous by envisioning themselves freely α-ing, as self-law-giver towards their will. Autonomy becomes a "fact of reason" as an essence of morality, because the awareness of the possibility to act otherwise "leads directly to the concept of freedom" (*KpV*, 5:30-5:31). Freedom and the moral law are thus interrelated for Kant. The Kantian conception of freedom under compatibilism is therefore somewhat similar to that of Frankfurt.

G. Kant's Conception of Agency Translated to Structures of the Will.

Let us translate the Kantian conception of agency to the structures of the will expressed in the *formal* account of self-governance.

The Kantian *will* is defined as "a capacity to determine itself to acting in conformity with the representation of certain laws" (*G*, 4:427).[62] Such a will is "contingently determinable" by either the moral laws as "principles of reason *in themselves*" or according to principles of reason that exemplify laws that serve one's inclinations, whereby practical reason serves as a means to an end (*G*, 4:414).[63] Kant thus suggests two mutually exclusive possibilities.

The first possibility considers inclinations the *primary* incentive for action. Inclinations are defined as "[t]he dependence of the faculty of desire upon feelings" [*Gefühl*] (*G*, 4:413). Practical reason is thereby used as a *means* to realize an *end* in inclination. *Qua* structures of the will, inclinations can be translated to the *desiring* structure of the will. The aforementioned second possibility however, assumes that agents' wills can be moved by means other than inclination. The very fact that agents can act according on the *representations* of certain *laws*, irrespective of whether these denoted representations of laws are moral or not, means that agents have a capacity to determine themselves by means *other* than inclinations (desires) *qua* structures of the will (*G*, 4:397).[64] This is thus the *intention*.[65]

The concept of acting upon subjective *principles* of action under "representation of certain laws", leads to even stronger self-regulating capacities in Kantian agents. Such subjective *principles* of action can be *loosely* equated to *policies* or *resolutions* as structures of the will—

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[62] Incentive or inclinations *always* play a role, but in moral actions inclinations are *subverted* to duty (Allison, 1990, 111).

[63] Kant's ethics has both compatibilist and incompatibilist readings regarding the will. For compatibilist readings, see: (Allison, 1990; Korsgaard, 1996). For incompatibilist readings, see: (Wood, 1984; Ameriks, 2000; Watkins, 2004). Structures of the will are entirely naturalistically embeddable, however, and should therefore be consistent with either a compatibilist or incompatibilist reading of Kant's work. Rather than accepting one reading in favor of another, this subsection attempts to be consistent with both.

[64] Note that Kant explicitly phrases "laws" in the *plural*, and therefore considers the possibility that agents might use both moral and immoral maxims to act upon.

[65] What Kant calls the "faculty of desire" is troublesome to translate to the terminology used by philosophers using different structures of the will—as this faculty of desire can be moved by both desires and intentions as structures of the will.

precisely because they are *principles*. Additionally, a *planning* structure of the will can also be located in Kant's duty of apathy, because agents ought to govern themselves *cross-temporally*. Agents have to comprehend themselves as temporally extended agents, in order to avoid breaking the Moral Law henceforth—*e.g.*, agents ought to stay in good physical and mental health to avoiding breaking their duty hereafter.

Both compatibilist and incompatibilist interpretations of Kant would nevertheless accept that agents' intentions and policies ought to master their desires. Autonomy is thus regarded as the *legislative* power of the will, while autocracy the *enforcing* power of the will.[66] From the practical standpoint, autonomy is *conceivably unlimited* but the mastery of inclinations under autocracy is limited, due to agents' thorough acquaintance with their own deficiencies—even though agents cannot know whether they are fully free, they nevertheless also *know* their inclinations. That inability to master inclinations under an autocracy of practical reason makes human agents *evil by nature*, because an inherent propensity to favor inclinations over the Moral Law (*R*, 6: 32).[67] From the perspective of the *formal account*, Kantian agents must thus create *plans*, *policies* and *resolutions* to avoid henceforth breaking the Moral Law.

To visualize the outcome of this section, a schematic display of the translation of the Kantian conception of agency to the structures of the will has been included in Appendix III. After sections two through five developed the *formal* and *real* accounts of self-governance, and demonstrated that they corresponded to each other, this section has added a normative dimension to the argument, in that Aristotelean and Kantian agents have *normative* reasons to promote self-governance. The next section connects technologies and their side products to this normative dimension, by arguing that these technologies affect the self-governance of agents, and that agents' self-governance merits shaping these technologies and side products in their environments.

VII. The Environmental-Organization of Ethics.

This section firstly demonstrates that technologies and their side products, such as artificial light, sound and environmental toxins, affect self-governance under the *real* account developed thus far. Previous sections demonstrated that the *real* account and *formal* accounts corresponded, and

[66] On the relation between autonomy and autocracy, see: (Baxley, 2010, 59).

[67] *Radically* evil means that humans have an ineliminable evil root (*radix*).

that the Aristotelean and Kantian ethical theories could also be described in terms of the *formal* account—this section therefore establishes that technologies and their side products affect ethical decision for Aristotelean and Kantian agents. Additionally, the final part of this section explicates the differences between the Environmental-Organization of Ethics thesis, and previous philosophies that consider the environment's effects upon agency within the Philosophy of Technology.

VII. A. Artificial Light.

This subsection demonstrates that artificial light affects agents' ethical choices. For example, from the perspective of the *real* account, artificial light can augment agents' Type-II system's ability to control their Type-I system, or promote over-activities in the Type-I system. Philebus is consequently *prone* to choose differently in optimized lighting environments compared to poor lighting environments. Poor lighting environments will give Philebus the propensity to act *contra* his better judgment, or break his resolutions instead, while optimized lighting environments prompt the opposite. This subsection first considers the physics of light, then regards the role of light during evolution, and subsequently considers light's biological effects upon self-governance.

A. The Physics of Light.

Let us first survey light from a modern physics standpoint, under which light is commonly called a photon. Light is part of the electromagnetic spectrum, and what is considered full-spectrum light for humans is subsumed under that electromagnetic spectrum. The full light spectrum consists of light that is visible to the human eye and light invisible to the human eye. The visible light consists of all colors of the rainbow, and the invisible light comprises the ultraviolet (UV) and infrared (IR) light (Sliney, 2016).[68]

Each part of the light spectrum has different wavelengths, which are visually represented at Appendix IV-A. Ultraviolet has the shortest wavelength in the 10nm and 400nm range. Next, visible light (generally) dwells between the 400nm and 700nm bounds, and infrared consists of wavelengths between 700nm and 1mm (1.000.000nm) (Lynch & Livingstone, 2001, 231). These different categories of light can be divided even further, such as different parts of the UV

[68] Some people such as children can nevertheless see parts of what is considered the invisible light spectrum as well.

spectrum (UV-A, UV-B and UV-C), different parts of the IR spectrum (near, middle and far infrared), and different parts of the visible spectrum (purple, blue, green, yellow, orange, red).

B. Light during Evolution.

For 3,5 billion years, many of the earth's biological creatures lived under a full spectrum sunlight during the daytime.[69] Sunlight was the predominant light source on earth during that time, excluding exceptions such as natural disasters that created light through fire. Out of that 3,5-billion-year period, humans learned to intentionally control light only 400.000 years ago (Schopf, 2006; Schivelbusch, 1995).[70] Humans accomplished this control though the advent of fire-making. From about 5.000 B.C.E. onward, humans also gained the ability to create light from other materials, eventually resulting in light emitted by lamp fuels and candles (Williams, 1999).

Let us consider the evolutionary light spectrum that humans were exposed to. In the morning hours, only the infrared and visible light of the sun reaches the earth's surface. *Color temperatures* measured in Kelvins (K) are very low at that moment.[71] The higher the Kelvin value of a light source becomes, the more the light spectrum tilts towards the UV, purple and blue part of the spectrum—and the lower the color temperature, the more the light spectrum tilts towards the IR and red part of the spectrum. The color temperature of the sunlight, viewed from the earth, progressively increases during the day, while peaking around noon. Depending on where one lives on the earth, blue and especially UVA light will only be added later on in the day. Areas that are not close to the equator will not receive UVB light on the surface year-round, but will *usually* receive UVB during the spring and summertime (Jablonski & Chaplin, 2010).[72]

Apart from some biological creatures that have evolved in the soil or deep in the ocean, many creatures are dependent on the sun in some way. This effect also holds true for humans, as a 24,2-hour circadian clock is entrenched in their biology. This circadian clock is evolutionarily built towards the solar light spectrum. Blue and green light photons that hit the eye during the day

[69] The light intensity of moonlight is negligible, as its intensity is s a million times lower than that of the sun (Kyba, Mohar & Posch, 2017). This means that few moonlight photons reach the earth, decreasing the capacity of the moon to affect human biology.

[70] While great apes have entered the stone age, they cannot intentionally create fire (yet) (Mercader et al., 2006).

[71] Not to be confused with denoting temperatures as in *heat* in degrees Kelvin.

[72] UVB is essential to create vitamin D through the skin. For many, skin based-vitamin D is therefore only acquired during the spring and summertime (Nair, R., & Maseeh, A., 2012).

suppress melatonin levels in the brain and stimulate wakefulness (Wright & Lack, 2001). The mechanism for this suppression is a pathway from the eye to an area called the *suprachiasmatic nucleus* in the hypothalamus (Weaver, 1998). Light entering the eye thus informs human biology that it is daytime and the body needs wakefulness, or that nighttime has come and individuals should calm down for sleep.

C. Artificial Light Technologies Matching Evolution.

Before 1900, no biological creature would ever experience green, blue, purple or UV light during nighttimes. Even campfires and oil lamps almost exclusively emit red and IR light. Let us consider how post-1900 artificial lighting has altered the environments in which humans live.

Thomas Edison's incandescent light bulb still stayed relatively close to the light spectrum of the morning and evening sun, emitting large amounts of red and especially infrared light.[73] Electric light bulbs only began to be used extensively after 1900, and mostly consisted of incandescent light bulbs. Only with the invention of gas discharge and fluorescent lamps, did it become possible to have large amounts of violet, green and blue light in standardized bulbs. These bulbs then slowly perfused all over the planet. Gas discharge or fluorescent bulbs made it possible to influence one's circadian rhythm after sunset – by activating fluorescent bulbs in his office and thereby tricking his brain into thinking it is daytime, Philebus could now suppress melatonin levels at 1:00AM. This had not been possible during the previous 3,5 billion years of evolution.

Let us consider how various bulbs compare to sunlight—see Appendix IV-B for a visual aid comparing the light spectra of different modern bulbs to sunlight. Even though there are many light bulbs on the market today, no bulb comes close to fully mimicking the sun. Many modern bulbs do not emit *any* UV or IR light, and most do not emit a *continuous* light spectrum. A continuous light spectrum means that there are no gaps in photonic wavelengths on the light spectrum.[74] Aforementioned bulbs such as fluorescent or gas discharge lamps therefore often contain large gaps in their light emittance frequencies, while having very high peaks around other frequencies.

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[73] Thomas Edison was the first to successfully *commercialize* an incandescent bulb (Friedel & Israel, 1986).

[74] There are other differences between sunlight and artificial light, such as the *polarization* of light—but these differences lie beyond the scope of the argument.

Incandescent and halogen light bulbs emit large amounts of red and IR light, but very little UV, purple, blue and green. Nevertheless, incandescent and halogen bulbs match the light spectrum of the sun for the first few hours after dawn and a few hours before dusk. These are the *only* commercial light bulbs that emit large amounts of IR light. The solar irradiance reaching the earth's surface contains about 45% IR light (Escobedo, Miranda & Martínez, 2016). Phrased differently, IR makes up almost half of the total solar spectrum irradiance.

In the US and EU, however, both incandescent and halogen bulbs are also currently being phased out (European Commission, 2005; 2008; 2009; 2012; 2015; Department of Energy, 2016). The reason is that governments literally consider IR emissions as wasted energy – thereby ignoring any biological effects light may have, focusing exclusively on *illuminance* levels. Conceptions of illuminance solely measure *visible* light output per unit of wattage. The more visible light per Watt bulbs thus put out, the more energy-efficient bulbs are considered to be. IR and UV do not help illuminance, and are therefore eliminated from modern bulbs. However, it also means that consumers have less options to use IR (or UV).

While LED, fluorescent, and gas discharge bulbs generally contain extensive amounts of blue and green light, their lighting patterns fall almost exclusively within the visible light spectrum. These bulbs also gravitate towards higher K color temperatures, mimicking the color temperature of the noon sun. While LEDs usually have a more continuous light output than gas discharge or fluorescent bulbs, all aforementioned bulbs are specifically built to contain as little UV or IR frequencies as possible, to make them energy efficient. Adding UV to aforementioned bulbs is nevertheless already technologically possible. Gas discharge bulbs for reptiles for example, are specifically built to contain considerable amounts of both UVA and UVB.

An additional drawback with LED and fluorescent bulbs is that they emit light in pulses rather than putting out a continuous stream of energy. Pulsing light emittances cause stress in susceptible *parts* of the human population (Hazell & Wilkins, 1990; Küller & Laike, 1998; Inger, Bennie, Davies & Gaston, 2014).

Gaps in the light spectrum, pulsing, and the absence of UV and IR thus signify the differences between the sun and modern light bulbs. Since the year 2000, however, lighting environments have altered at accelerated levels in the developed world. Tablets, flat screen televisions, and computer screens, all emit unprecedented quantities of blue light. These devices affect circadian biology far more extensively than previous technologies (Cajochen et al, 2011).

An average smartphone user is exposed to the light of their screens an average 221 times a day (Tecmak, 2014). Most of these modern devices emit as much as three to four times the wattage of blue light photons compared with red. By contrast, the morning and evening sun emits more red than blue light, and at noon the sun emits only *slightly* more blue than red light. Such blue-light exposures are thus unheard of from an evolutionary perspective.

D. Light's Biological Effects and Self-Governance.

Higher quantities of blue and absences of IR and UV light would be biologically unproblematic, if light merely illuminated human environments. Instead, light has extensive biological effects.[75] This subsection examines the consequences of light on *human* biology, focusing on light's biological effects in relation to human self-governance.

Photons do not just touch the surface of the body, but physically penetrate the skin and the eyes. Different forms of light penetrate the body at different depths (Avci, Gupta & Sadasivam, 2013). These penetration depths are visualized in Appendix IV-C. UVB carries the highest photonic energy of the sunlight's spectrum on the earth's surface, and only penetrates 0,1 mm deep. UVA penetrates about 1mm deep and subsequent longer wavelengths with lower photonic energy penetrate the skin progressively deeper. Penetration depths continue until near-infrared (NIR), which permeates beyond 5mm depth. Many photons can therefore reach the blood vessels that lie in the lower parts of the skin [*dermis*] or fat layers under the skin [*hypdermis*]. That way, light can have systemic biological effects. Nevertheless, even the shortest wavelengths such as UVB already have systemic effects, as UVB is a necessary precondition for the creation of vitamin D through the skin (Reichrath, 2007).

Full-spectrum light-exposure should be balanced, as all parts of the light spectrum can damage humans in higher dosages. For example, excessive UV exposure can cause damage to the skin (cataracts), sunburn, skin cancer (WHO, 2017) and immunosuppression (Schwarz, 2005)—too much blue light can cause eye damage (Algveve, Marshall & Seregard, 2006) and suppress melatonin levels (Brainard et al., 2001)—too much red and infrared light on the skin can decrease

[75] Solely scientific studies including human subjects have been included, thereby excluding thousands of animal studies. Animal studies are deemed problematic as they are hard to generalize to humans, especially regarding higher-brain functions such as planning capacities. These higher-brain functions differ considerably between humans and other animals. Additionally, solely wavelengths that have the largest biological effects have been included, to keep the argument concise.

skin quality (Kim & Calderhead, 2011; Avci et al., 2013). Nevertheless, *insufficient* exposure levels across the spectrum are just as harmful.

Let us first consider the biological effects of full-spectrum light – full-spectrum light will be defined as containing both UV, visible light and IR.[76] Full-spectrum light exposure increases serotonin levels in the brain (Lambert, Reid, Kaye, Jennings & Esler, 2002). By affecting serotonin levels, full-spectrum light can treat mood disorders and anxiety, which cause failures of self-governance. Mood disorders, anxiety and even completed suicides are higher during the wintertime, and serotonin (through light) is a likely mediator of such pathologies (Sansone & Sansone, 2013). To maximize its serotogenic effects, full-spectrum light not only needs to enter the eyes but also needs to reach the skin's surface (Slominski, Wortsman & Tobin, 2005). Isolated UVA rays can specifically increase serotonin in the brain – meaning that mere visible light is not enough to obtain *all* benefits of full-spectrum light (Gamblicher et al., 2002).

As section V discussed, optimal serotonin levels decrease impulsive behavior such as aggression, addiction, harm-seeking behavior and zero-sum social behavior. Moreover, serotonin increases the ability to act upon actions that agents *assume* to be of import, but for which they currently have little motivation.

Full-spectrum light moreover decreases melatonin and norepinephrine levels (Roberts, 2000). Lower levels of norepinephrine decrease stress, while the suppression of melatonin promotes wakefulness. Combining higher serotonin levels with lower norepinephrine levels will additionally inhibit aggressive impulses, anxiety and fight-or-flight responses, thereby augmenting self-governance capacities.

Full-spectrum light-exposure furthermore increases dopamine levels in the brain (Tsai et al., 2011). Having optimal dopamine levels aids in fighting feelings of anxiety, depression and apathy, and increase goal-directed behavior through increasing dopamine-related motivation. UVA light is mainly responsible for increasing dopamine, although *visible* light has a positive effect as well (Diehl, Mintun, Kupfer & Moore, 1994).

Lastly, full-spectrum *visible* light improves hormone functioning, increasing testosterone levels (Kripke et al., 2010; European College of Neuropsychopharmacology, 2016). This effect is

[76] Many lightbulbs that claim to be "full spectrum" are therefore excluded as full spectrum under the current definition, because they do not emit any UV or IR *at all*. Such bulbs only contain the full *visible* spectrum and not the full spectrum under which humans evolved.

especially robust when testosterone levels are (too) low. Optimized testosterone levels can improve moods and outlooks on life.

Let us now consider *isolated* wavelengths for their specific effects. Blue light for example, is overly present in many modern-day devices, such as screens, LED's and other electronic devices. Isolated exposures to blue light can raise cortisol levels (Figueiro & Rea, 2012). These cortisol levels are constitutive of circadian rhythms, but also raise stress levels. Cortisol levels ought to be lower in the afternoon until night, while quickly rising around 4 A.M. to prepare the body for daytime (Kunz-Ebrecht, Kirschbaum, Marmot & Steptoe, 2004). Individuals using blue-lit tablets after sunset, thereby raising their cortisol levels and becoming more stressed. As laid out in section V, stress emphasizes the pre-dominance the Type-I system at the cost the Type-II system—and a predominating Type-I system impairs impulse control and planning capacity. The enormous amounts of blue light emitted by modern devices even unnecessarily raises cortisol levels during the day. Exposure to the full visible spectrum light on the contrary, actually lowers cortisol levels (Jung et al., 2010).

Additionally, blue light can cause sleep deprivation when agents are exposed to blue light at the wrong times. Sleep deprivation likewise inhibits capacities for self-governance over time (Krizan & Hisler, 2016). Blue light simulates the endocrinological effects associated with sunrises. Human beings have evolved to be exposed to that blue-light dominant effect mostly during the early morning to late afternoon, depending on one's latitude on the earth.[77]

It was previously contended that the EU and US have been phasing out incandescent and halogen lighting for residential purposes—and both were the only viable *commercial* IR sources on the market today. In studies of isolated IR wavelength, infrared exposure can increase serotonin levels (Tomaz de MM, Núñez, Kato & Ribeiro, 2016), which consequently improves mood (Barrett & Gonzalez-Lima, 2016) and lowers anxiety levels (Schiffer et al., 2009). The mood-boosting and anti-depressive effects of IR light are just as great as bright *visible* light (Meesters, Beersma, Bouhuys & van den Hoofdakker, 1999). Moreover, IR can also improve executive function (Blanco, Maddox & Gonzalez-Lima, 2017) leading to greater conscious self-control (Grover, Weston & Weston, 2017). In essence, optimal doses of infrared light enhance the self-governing capacity of the Type-II system of the brain in significant ways.

[77] The UV light that arises within the sun later, decreases the stimulating effects of blue light again.

Red-light exposure during the evening can even increase melatonin levels, thereby improving sleep quality (Zhao, Tian, Nie, Xu & Liu, 2012) – optimal sleep improves self-governance the subsequent day. Overall, this subsection thus demonstrates that artificial light does affect agents' capacity for self-governance. To optimize self-governance, artificial light ought to closely follow the sun's light-emittance pattern, while bulbs also ought to be devoid of flickering pulsations. Agents additionally need to be able to regulate the light intensity during the day, to mimic the effects of spending time in the shade—continuous maximized light outputs are therefore not necessary. Creating such an effect is only partially possible by combining incandescent and/or halogen bulbs for their yellow, red and infrared part of the spectrum, and adding reptile bulbs during 10 A.M. and 4 P.M. to simulate light emitted under the sun's higher color temperatures such as blue light and UV.

Reaching light outputs mimicking the sun can *seem* costly, *prima facie* requiring an estimated 10 to 20 times as much energy as currently is being used for fluorescent and/or LED technologies. However, a side-benefit of the IR light emitted by such lighting setups is that it can lower heating costs in buildings. These light setups do and not have to be activated all-day long either. Additionally, lighting environments optimized towards human evolutionary biology also entail that much less light is being used after sunset and before dawn – so the net cost of such lighting setups will be closer to double the current price.

Next, let us consider the effects of *sound* on self-governance.

VII. B. Sound, Noise, Music.

Working in deep concentration and focus is increasingly paying off in current societies, because most disciplines get increasingly specialized, requiring more and more concentrated effort (Newport, 2016). However, most Western societies contain progressively more distractions in individuals' private and occupational lives. Philebus might be continually exposed to arriving e-mails, increasing noise in his work space because progressively more people share that same workspaces, and require a 27/4 cell-phone connectivity for his job.[78]

Let us firstly consider the *negative* influence that sound can have – a phenomenon commonly

[78] From an evolutionary perspective, sound and music already exist for 35.000 years (Conard, Malina & Münzel, 2009).

identified as *noise stress* or *noise pollution*.[79] Physiologically, noise stress increases arousal, blood pressure and heart-rate (Münzel et al., 2014). Noise stress can literally raise stress hormones and neurotransmitters such as cortisol, epinephrine and norepinephrine (Babisch, 2003; Prasher, 2009). Higher levels of noise deplete nutrients in the brain more quickly and degrade physical performance, while low levels of background noise do not. Degradations in physical performance can nevertheless partially be prevented by increasing nutrient consumption (Simpson & Cox & Rothschildt, 1974).

In the long term, high-enough levels of noise stress cause "exhaustion, defeat, annoyance followed by decreased muscle movement, social contacts and mood changes" (Naqvi et al., 2012). Individuals undergoing long-term noise stress exhibit more cautious decision-making processes (Wright et al., 2016). On a general level, noise stress affects self-governance by prompting a "fight or flight" response, promoting Type-I system over-activity while inhibiting the Type-II system. As to structures of the will, noise stress thus even affects *planning* ability, because noise promotes more risk-averse decision-making processes.

Contrarily to noise stress, individuals can also use sound in their environments to *augment* self-governance. Music is already used for cognitive enhancement and self-governance purposes, and can accomplish the opposite effects of stress, improving motivation, concentration, well-being and relaxation. As a cognitive enhancer, moreover, music does not have the risks that are commonly associated with off-label prescription drugs (Anderson & Kamphorst, 2015; Kjærsgaard, 2015).

Music yields both sensory and cognitive experiences, stimulating both the auditory cortex as well as several subcortical regions (Samplimoor et al., 2013). Music consequently increases dopamine and serotonin levels (Evers & Suhr, 2000; Zatorre, 2015), lowers cortisol levels and anxiety – especially when individuals are stressed (Thoma et al., 2013; Jiménez-Jiménez, García-Escalona, Martín-López, De Vera-Vera & De Haro, 2013).

Music and sound can also influence the brain through other means than neurotransmitters, affecting the frequency of oscillations within neuronal networks (Buzsáki & Draguhn, 2004). Different "brain states" are tied to different frequencies of oscillations. The delta-brainwaves of 1,5-4Hz which are mainly active while sleeping are very different than the brainwaves that are

[79] Randomized controlled trials are rare regarding noise stress because of the ethical implications of subjecting agents to high noise levels for longer periods of time.

active when one is focused, which have a frequency of 10-30Hz (Siegel, Donner & Engel, 2012). An example of cognitive enhancement through music might be attempting to affect the rhythm of music, whereby a stable pitch generates lower reaction times compared to unexpected auditory inputs (Jones et al., 2002). That stable pitch stimulating beta-oscillations in the brain, and entrains a *status quo,* overrides novel or unexpected environmental stimuli (Engel & Fries, 2010). In other words, promoting beta oscillations increases the maintenance sensorimotor or cognitive tasks individuals currently carry out, while simultaneously improving their impulse control.

The best way to achieve the positive reinforcements is to listen to music that individuals consider enjoyable (Schellenberg & Hallam, 2005). Mozart would hence not always be the obvious choice.

All-in-all, individuals would should consider avoiding noise stress and use music or white noise (vocal-free music) for optimizing their self-governance. Next, let us consider environmental toxins, which can be considered a *side product* of technology.

VII. C. Exogenous Toxins.

Exogenous toxins are almost omnipresent in modern societies (Pizzorno, 2017). Consider this: Individuals are exposed to benzene when gassing up a car in the city, to pesticides from agricultural practices, phthalates from cosmetics, lead from fuel remnants emitted by airplanes, neurotoxins from paint and petroleum chemicals in mattresses. Kids are exposed to toxins in their toys. Adding insult to injury, air pollution, heavy metals found both in the air and drinking water, and plastic products containing phytoestrogens that disrupt hormone functioning. Most of these aforementioned exogenous toxins did not exist before the 20th century. To make matters worse, up to 50% of US buildings are currently infected with toxic mold.

Exogenous toxins are not dormant or inactive materials, but include bioactive agents, that even cause *transgenerational problems*. Mothers transfer toxins to their fetuses during pregnancy, and subsequently while breastfeeding (Mogensen, Grandjean, Nielsen, Weihe & Budtz-Jørgensen, 2015). Umbilical cords of newborns nowadays contain an average of 232 different exogenous chemicals (Environmental Working Group, 2005).

Fat is *one* preferable storage location for exogenous toxins, and the fatty human brain thereby becomes a preferred location for toxin storage as well. Self-governance processes thus become especially susceptible to exogenous toxins, because countless exotoxins get stored in the

brain's fat– thereby affecting brain-functioning (Orisakwe, 2014). Although exotoxins cause extensive health problems including cancer, cardiovascular disease, diabetes, and autoimmune disorders, the discussed effects regarding exogenous toxins are limited to the area of self-governance.

A. Heavy Metals.

Let us firstly consider the effects of heavy metals. Poisoning by heavy metals can be accomplished in several ways, such as exposures through air, consumed water, *via* the lungs, skin, or stomach. Heavy metals activate the immune system, which subsequently redirects energy from higher brain functions to that immune system (Dietert, 2006). Neurodegeneration is also caused by heavy metals, as higher concentrations of lead and cadmium can be found amongst those affected by central nervous system diseases (Stanley & Wawke, 2002). This neurodegeneration consequently affects self-governance capacities. Four important heavy metals are considered by this subsection: lead, cadmium and mercury and arsenic.

Even low levels of lead exposure can promote anxiety, depression and panic disorders (Bouchard, Bellinger & Weuve, 2009; Eum, 2012). Children are especially susceptible to lead toxicity—lead causes *physical degenerations* of their prefrontal cortex, consequently weakening the capacity of the Type-II system (Finkelstein, Markowitz & Rosen, 1998). Chronic lead exposure inhibits higher cognitive functioning for adults as well, affecting both impulse control and planning ability (Schwartz, Stewart & Bolla, 2000; Schwartz et al., 2005). While exposure to lead can occur through drinking water, lead pipes that transfer drinking water are often problematic as well, as lead leaches into the transferred drinking water. Cosmetics are another very common source of exposure, because lead levels in cosmetics are minimally regulated. As there are *no* safe levels for lead exposure, maximal lead blood-levels should be established at zero parts per million, thereby meriting regulation of any product that physically transfers lead to human beings.[80]

Cadmium is another exogenous heavy-metal toxin. Cadmium exposure increases norepinephrine levels and stress levels, lowers overall moods, and causes hormonal problems—

[80] In the US, "safe" blood levels of lead have been going down for 60 micrograms per dl of blood to 10 micrograms per dl of blood, but current studies even demonstrate that 5-10 micrograms per dl blood increase the risks for many pathologies (Schober, Mirel, Graubard, Brody & Flegal, 2006).

all while increasing estrogen and decreasing testosterone levels (Wang & Du, 2013). Common sources of exposure to cadmium are industrial pollution, active or passive cigarette smoke, chemical fertilizers, drinking glasses, jewelry, and residues in the food supply (Mead, 2010; State of Oregon Department of Environmental Quality, 2015). Cadmium causes an immediate immune response as do other heavy metals, creating a continuous stress-response, thereby lowering self-governance capacities.

Mercury is one more common toxic heavy metal. Common mercury exposure includes toxic water supplies and consumption of fish high on the food chain, and dental amalgams. Mercury has a half-life of two months in the body and can wreak havoc for long periods before it is cleared. The capacity of the human body to expel mercury is limited, leading to continuous when mercury buildup mercury exposure exceeds basic removal levels (Guzzi et al., 2006). Mercury is an intergenerational problem as well, as mercury leaks from the mother's brain into fetuses (Palkovicova, Ursinyova, Masanova, Yu, & Hertz-Picciotto, 2008). After birth and into adulthood, mercury prompts anger, depressions and anxiety (Siblerud, Motl & Kienholz, 1994). Excessive mercury levels can thus lower self-governance as well, promoting excessive activities in the Type-I system.

These exposures to heavy metal exotoxins are not incidental—arsenic overexposure alone currently affects *200 million* people on a worldwide basis (Tolins, Ruchirawat & Landrigan, 2014). Without going into extensive detail again on arsenic, many of its effects overlap with aforementioned heavy metals. Elevated arsenic levels lower impulse control and attention (Tsai, Chou, The, Chen & Chen, 2003)—all heavy metals thus affect self-governance capacities by causing stress through a continuous activation of the immune system, thereby increasing the activity of the Type-I system while undermining the self-governance capacity of the Type-II system.

B. Air Pollution.

Along with heavy metals, air pollution affects executive functions as well (Gatto, Henderson & Hodis, 2014). Pollutants include nitrogen oxide (NO), ozone (O_3), particulate matter (PM), carbon monoxide (CO), and sulfur dioxide (SO_2).

Air quality should not be considered a "peripheral issue", as conservative estimates contend that air pollution causes 3 million premature deaths globally *every year* (Lelieveld, Evans, Fnais, Giannadaki & Pozzer, 2015). In some areas such as big cities, air pollution is omnipresent—

higher concentrations of outdoor pollutants increase indoor pollutants levels as well (Adamkiewicz et al., 2011).

As with most heavy metal exposure, air pollution causes an *immediate* immune response, while simultaneously raising cortisol levels (Tomei, Rosati & Ciarrocca, 2003; Calderón-Garcidueñas et al., 2013). This immune response subsequently leads to decreased brain volumes in areas that are critical for long-term self-governance, such as the PFC. Air pollution literally impairs higher brain functions through systemic inflammation and DNA damage (Power et al., 2011; Chen & Schwartz, 2009). Air pollution is also linked to higher incidences of depression (Szyszkowicz, Kousha, Kingsbury & Colman, 2016).

Air pollutants moreover affect fetal development during pregnancy (Harris, Gold & Rifas-Shiman, 2016)—this pollution is therefore particularly harmful for young children, because of children's greater penetrability of the blood-brain barrier and because children are still (neurologically) developing. Children additionally have smaller body sizes, so dosages will have larger effects upon them compared with adults.

There are fortunately several ways to optimize indoor air-quality to avoid the effects of air pollution. The common-sense solution would be to avoid polluting areas altogether, by moving to a less pollutive location. Moving is not an option, however, for many individuals. High-quality filtration systems and indoor vegetation can increase indoor air-quality (Claudio, 2011). Vegetation not only *filters* air quality, but might also directly improve moods (Kaplan, 2001). This improvement is exemplified in the fact that walking through forests instead of through a city decreases cortisol, strengthens the immune system and decreases problems with planning (Park et al, 2006; 2007).[81] Other strategies are avoiding venturing outdoors at peak-air pollutive periods and wearing protective equipment (Laumbach, Meng & Kipen 2015). Nasal breathing, and being in good cardiovascular-pulmonary conditioning are additional basic strategies. Lastly, certain types of respirators can be used—but all-in-all, there is no complete solution to avoiding air pollution when living in toxic areas.

C. Toxic Mold.

Just as some heavy metal exposures should be kept close to zero, the same holds true for toxic mold. There are thousands of different mycotoxins—some of the more common ones are

[81] However, the effects of forest may be explained as combined visual and olfactory stimuli.

Alfatoxins, Ochratoxins and Trichothecenes. Toxic molds can be found in 20%-50% of all buildings in the US (Gunnbjörnsdóttir et al, 2007; Mudarri & Fisk, 2007).

Exposures to toxic molds occur through their spores that build on damp and porous areas of buildings, which subsequently emit mycotoxins through the air. Such damp areas usually consist of parts of buildings that are affected by water leakages and floods. Bathroom and kitchen sinks can often be equally problematic because of moisture. The best solution is again to avoid mold exposure altogether, but this is generally difficult as molds often affect residential buildings (Hope, 2013). Toxic molds can be extremely deceptive, because individuals affected by mold tend to stay home because they feel ill, thereby *increasing* exposure levels, resulting in vicious exposure cycles. Moreover, even cleaning up small areas of toxic mold can be dangerous, and larger contamination merit professional clean ups.

At best, mold causes "allergic" reactions, general bodily inflammation, breathing problems and immune dysfunctions. At worst, mold causes cancer and autoimmune disorders under long-term exposure. Toxic molds precipitate continuous immune responses as long as individuals are exposed to them, thereby affecting self-governance.[82] Mold specifically affects executive functions, literally lowing PFC activity, at the behest of lower brain regions such as the brainstem – its effects can be equated with a "mild traumatic brain injury" (Gordon et al., 2004; Crago, Gray, Nelson, Davis, Arnold & Trasher, 2003). Molds simultaneously cause neuronal degeneration in the brain, depleting dopamine levels (Doi & Uetsuka, 2011). Individuals consequently become more prone to depression (Shenassa, Daskalakis, Liebhaber, Braubach & Brown, 2007). Just as with heavy-metals and air pollution, toxic molds essentially reinforce the activity of the Type-I system at the expense of the Type-II system.

D. Miscellaneous Exogenous Toxins.

Let us lastly consider some miscellaneous cases. Modern society now also contains many different endocrine disruptors (Roy, Chakraborty & Chakraborty, 2009; Frye et al., 2012). These endocrine disruptors can be found in plastics such bisphenol A, chemicals like DDT, and foodstuffs such as phytoestrogens and phthalates.

Bisphenols in plastics for example, cause estrogen dominance and can lower other essential

[82] Mold problems are intergenerational again: prenatal mold exposure affects cognitive and self-governance functions *after* birth (Jedrychowski et al., 2011).

hormones such as testosterone, which in turn leads to mood disorders and bleaker outlooks on life. Bisphenols also cause problems with emotional regulation and lowering general executive functioning such as planning capacities in children (Braun, Kalkbrenner & Calafat, 2011).

Phthalates are equally problematic. Exposure to phthalates occurs through health and beauty products, such as fragrances, cosmetics and air "refreshers". Children with mothers with the highest quartile of phthalate exposure, experience an average I.Q. decrease of 6,7 points (Factor-Litvak, Insel & Calafat, 2014). Even *prenatal* phthalate exposure causes behavioral problems and decreased executive functioning in children when they are aged between 4 and 9, which indicates that such problems persist long after the initial exposure, and may even cause permanent damage (Engel, Miodovnik & Canfield, 2010).

Other "miscellaneous" exogenous toxins that merit mentioning are PCBs; pesticides such as glyphosate; roundup; radon exposure; and medicine leftovers in the water supply. Due to the scope of the argument, these topics will not be treated.[83]

E. Solutions to Exogenous Toxin Exposure.

Exogenous toxins seem almost impossible to completely avoid, as individuals living in rural areas might still be exposed to toxins such as pesticides and overflying airplanes—however, methods are available to cope with exposures. Even though the problems with exogenous toxins are immense, even *pandemic*, efforts to solve problems regarding exogenous toxins can lead to extensive health and self-governance benefits.

The first solution is lowering exposure levels (Pizzorno, 2017). Such lowering will decrease the continuous immune response, thereby increasing energy that can be allocated to other tasks, such as higher cognitive functioning. Secondly, individuals in society should also be made aware of how widespread exogenous toxin problems have become, so that they can take action. Thirdly, nutritional strategies can be used, such as a diet that is both *high* in absorbable micronutrients and fiber and *low* in exogenous toxins, which basically comes down to a diet that is high in organic

[83] "Everyday" technologies that could have additionally been included as well are cell towers, Wi-Fi, Digital Enhanced Cordless Telecommunications (DECT) telephones and smartphones, power lines—basically any technologies falling within the electromagnetic spectrum. Alternatively, room temperatures and continuous vibrations could lisewise have been added.

vegetables.[84] The stool is the preferred way to get rid of toxins, but the body needs a lot of fiber to use that pathway. The average individual only consumes about 15 grams of fiber each day (Slavin, 2005). This number is very low from an evolutionary standpoint, as humans generally consumed more than 100 grams of fiber on a daily basis. Sweating is a fourth strategy to lose toxins. Such transpiration can be accomplished by both standardized Finnish heat saunas, or IR light (Sears, Kerr & Bray, 2012). Remember that IR light is precisely is missing in modern lighting technologies such as LED, but can nevertheless aid in expelling exotoxins through infrared saunas. Lastly, exercise can also help to mobilize toxins, but one needs fiber or sweating to ultimately expel these toxins.

Decreasing *overall* toxin exposure levels is more important than focusing on individual exogenous toxins. Exposure to multiple different toxins does not only lead to build-up, but different toxins can also damage the body synergistically – and overall toxin levels moreover diminish the capacity of the overall detoxification system (Pizzarno, 2017, 683). Focusing on *individual* toxins can therefore be very misleading, because small exposures of several different toxins add up, and the cumulative effects of several toxins appear to have the most predictive power in empirical models.

The most important strategy is to avoid living near high-pollution areas. Even places that intuitively seem non-damaging, such as oil-fracking territories, emit many chemicals *via* the air that have been banned from consumer products. Individuals would do well to maximize the amount of protective gear they wear which can dramatically lower overall lower toxic loads in any pollutive environments. An all-encompassing strategy lastly, would not only consider *where* individuals live but take *all* possible exogenous toxins exposures (such as cosmetics) in their environment into account.

VII. D. Ethical Implications.

Previous subsections demonstrated that artificial light, sound and exogenous toxins all affect the self-governance capacities of agents. Up until now, this section mainly regarded the effects on agency from a perspective of the *real account*. Previous sections connected that *real* account to the *formal* account, and related them to ethical theories. How should Aristotelean and Kantian

[84] Grains might be more problematic, increasing gut permeability and leading to net-losses of micronutrients due to grains' antinutrients (Davis, 2014; Palmutter, 2015).

agents deal with the fact that aforementioned technologies and their side products, often downregulate the activity of the Type-II and cause an over-activity of the Type-I system?

Agents altering their environments to optimize self-governance shall be called *physically shaping* an environment. The reason for this terminology is that all technologies studied thus far, involve very fundamental physical and/or chemical processes. The notion of physical shaping thereby justifies the subtitle the *Groundwork of the Physics of Morals*.[85] Not only does physics *ground* ethics, agents can also turn to these physical processes to optimize environments and consequently optimize self-governance, thereby optimizing their ethical decision-making.

Under the Environmental-Organization of Ethics, Aristotle's *dictum* to deliberately choosing virtuous action over vicious action (*EN,* 1105a-1105b), entails that agents may have to shape their environments as well. Fundamental Aristotelean virtues, such as temperance and courage, might be affected by environments – the physical and chemical effects of environments may influence whether agents develop these virtues in the first place. When this Environmental-Organization thesis is related to Aristotelean ethics, environments do not fully *determine* the development of virtue for Aristotelean agents, instead, that environments might increase the probability of virtuous or vicious actions being carried out, or virtuous and vicious habits being developed. Agents who are currently not in a state of *akrasia* can also use their excess self-governance capacities to physically shape their environments and thereby optimize their subsequent self-governance capacities.

Such physically shaped environments would lead to fewer *epithumia* [ἐπιθυμία] and *thumos* [θυμός] determining behavior, thereby putting a greater emphasis on *boulêsis* [βούλησις]. As optimized environments downregulate the activities of the Type-I system while augmenting the capacity of the Type-II system, irrational determinations of the will stemming from the lower parts of the soul are diminished. Remember that from an Aristotelean perspective, *epithumia* and *thumos* ought to be conditioned in accordance to reason. When technologies thus bring up depression, anger or intemperate behavior, these outcomes undermine the hegemony of reason over the soul's lower parts. Instead, environments should be physically shaped in such a way that self-governance is optimized—which maximizes the ability of the chances of action being brought about by the rational part of the soul. An overactive Type-I system therefore directly

[85] While environments affect agents through physical processes, *willing* in agents is a physical process as well, albeit, at higher levels. How willing is a physical process is treated in the next section.

implies a rule by *epithumia* and *thumos*—while a strong Type-II system implies rule by *boulêsis.* Phrased differently, low well-being due to low serotonin and dopamine levels, and very high cortisol levels due to a continuous immune system activation, lowering the possibility of being ruled by rational desire as *boulêsis*.

The Environmental-Organization of ethics also implies that the content of Aristotelean *phronesis* [φρόνησις] is affected, as agents *ought to* become aware of how environments affect their self-governance. The intellectual virtues like *phronesis* [φρόνησις], which can be translated to "practical wisdom", denotes the ability to intellectually grasp judgments relating to action *in general* (*EN*, 1140a-1141a). *Phronesis*, as practical wisdom, then necessarily concern itself with effects of environmental technologies, which can be considered affecting action or agency *in general*. As intellectual virtues establish how moral virtues such as temperance and courage should be carried out, *phronesis* subsequently considers the role of the environments in the establishment of virtuous action. Moreover, *phronesis* was previously also related to the *planning* structure of the will—the physical shaping of environments entails that agents should *plan* to optimize their environments under *phronesis*, to maximize their ability to reach *Eudaimonia*.

Such tendencies are true for Kant's theory as well: Under a compatibilist reading of Kant, agents might be better capable of self-governance when their environments are optimally shaped. In other words, environments may directly augment agents' capacities for an "*autocracy* of practical reason" (*MS*, 6:383), increasing their capacity to determine themselves according to the "representation of certain laws" (*G*, 4:427). When environments decrease the relative dominance of the Type-I system, passions [*Leidenschaften*] and affects decrease in intensity. Kantian agents should rule their affects and govern their passions. Exposing themselves to endocrine disruptors that affect bodily hormones, which in turn creates bleaker outlooks on life and anxiety does not accord to the *duty of apathy* (*MS*, 6:408). The Kantian duty to improve one's capacity to follow the Moral Law is a perfect duty (*MS*, 6:387; 6:446)—agents should pursue this duty without limit—and if environments affect that duty, then environments ought to be physically shaped as well.[86]

[86] The Environmental-Organization contributes the following to Aristotle and Kant. It offers new (environmental) *explanations* and new (environmental) *examples* of the ethical principles developed in these theories, while nevertheless remaining consistent with these ethical theories. Section VIII, however, demonstrates how the Environmental-Organization understands the ontology of ethics in a wholly novel fashion.

Moreover, the concept of acting upon subjective *principles* of action under "representation of certain laws" also implied the *planning* structure of the will for Kant. This *planning* structure entails that optimizing the environment can and should become another "representation of certain laws", as objective principle, that agents should continually strive for. *I.e.* optimizing environments should not merely be considered an *intention* for Kant, but a longer-term *plan*. Additionally, agents ought to develop *policies* and *resolutions* to optimize their environments long term, as planning could also be subsumed under Kant's "representation of certain laws", while simultaneously falling under the duty of apathy.

The physical effects of environmental technologies suggest that the ethical theories discussed would do well to consider environmental effects of technologies and their side products affecting the self-governing capacities of agents. Taking environmental effects into account, while not yet a tendency for modern ethics, *ought to be*, in light of the argument developed in previous sections.

Let us subsequently consider how the Environmental-Organization of Ethics thesis diverges from previous ethical (environmental) work.

VII. F. Comparison to Other Environmental-Ethical Theories.

An *extended will* thesis was previously developed by other philosophers, wherein *agency* cannot be isolated to the brain but also extends itself through environmental objects (Heath & Anderson, 2010). That extended will implies that agents can shape environments to optimize their ethical decisions (Levy, 2007a; 2007b; Levy, 2012). Under the extended will thesis, agents can for example engineer their environment in a way so that they would do not have to rely as much on willpower. This notion leads to "distributed willpower", which accordingly disputes overreliances on *internal* conceptions of the will (Heath & Anderson, 2010, 240). *Internal* conceptions of the will contend that the notion of a will is something *intrinsic* to the agents' minds or brains.

The extended will provides several strategies to optimize the environments (Heath & Anderson, 2010). Philebus might put his keys in favorite shoes to prevent closing the door. Or he might prepare breakfast the evening before eating it, to maximize the chance of adhering to his diet. Moreover, Philebus may install a computer app preventing internet access to non-productive websites during office hours. However, the Extended Will exclusively posits *behavioral* and

psychological cues or strategies. Most of these strategies come down to Homer's example of *Ulysses* and the sirens, forcing a certain behavior or making it more likely (Paglieri, 2012). Current theories of distributed willpower do not study *fundamental physical and chemical processes* that affect human biology, as the Environmental-Organization of ethics does.

Other philosophers describe behavioral strategies that rely on psychology and behavioral economics (Levy, 2012). Such strategies attempt to limit the biases in human cognition. Examples are intrinsic human tendencies of choosing lesser rewards sooner over larger later rewards, confirmation biases, overconfidence, illusions about what makes agents happy, hedonic adaptations, *etcetera*. Proposed solutions entail a "soft paternalism" that minimally affects the autonomy of individuals - e.g. limiting opening hours of places selling alcoholic beverages and taxing unhealthy choices – but the behavioral economic conception regresses into cues and behavioral strategies again.

The closest theory to the Environmental-Organization of ethics thesis contends that uplifting music can heighten motivation (Anderson & Kamphorst, 2015). Under that theory, however, the motivational augmentation of music is explained in terms of *mood* and not reduced to fundamental neuroethical constructs such as neurotransmitters or hormones. Again, mood remains a psychological construct, and technology is certainly not analyzed in terms of biological consequences of fundamental chemical and physical effects.[87]

VIII. The Groundwork of the *Physics* of Morals.

This last section will transform the argument to show how the Environmental-Organization of ethics thesis can be naturalistically embeddable, but develop a (novel) compatibilist conception of freedom as well—deterministic implications have been recurrently leveled against the Environmental-Organization of ethics thesis. This understanding will be accomplished through F.W.J. Schelling's early *Naturphilosophical* philosophical works.[88] This section additionally

[87] A theory like the Actor Network Theory might reduce agency to networks, thereby positively including both human and non-humans into the domain of agency. However, the effects non-human entities have upon networks is not reduced to fundamental physical or biological processes (Callon, 1986; Akrich 1992; Latour 1992; 2005). Non-human entities provoke behavioral effects again, such as a door that regulates the movements of human agents.

[88] This section has been created based on the influential interpretations of Bruce Matthews (2011), Ian Hamilton Grant (2006), Tyler Tritten (2012) and Bernard Freydberg (2008), in addition to Schelling's own works.

indicates how the distinction between the *formal* and *real* definitions of *akrasia* and/or weakness of will are only apparent. Other goals are to sublate the external versus internal distinction between agents and their environments, and to prove that the argument in this thesis is not merely empirical. Empiricism being another counterargument that has been leveled against the current thesis.

Instead of attempting to articulate a final word on these aforementioned issues, this section is a *rudimentary* attempt to develop an overarching conceptual framework from which the *parts* articulated in previous sections can be understood from the perspective of the *whole*.

A. *Naturphilosophie.*

As post-Kantian philosopher, Schelling wanted to reverse the ontological primacy of the transcendental subject over *nature*. The (post-)Kantian ontological primacy of the *human* subject culminated in F.G. Fichte's *subjective idealism*, where nature was merely a derivative limitation *within* a self-positing I (1795/1982). In other words, nature only exists insofar it acts as a limitation on the solipsistic I, but nature can *simultaneously* be reduced to that I.

For Schelling on the contrary, nature is the *primary* subject, instead of the Kantian transcendental ego being the subject. Nature as subject, grounds everything—and "anything whose conditions simply cannot be given in nature must be absolutely impossible" (*SW*, III, 571; 1800/1978: 186). The human species emerge out of nature in an evolutionary process—but contrary to most previous philosophers and scientists of the 18th century, Schelling also accepts what is called *deep* time. For Schelling, therefore, there have been times when no humans existed. The conception of species creation (and destruction) proves difficult for Kant's transcendental ego or Fichte's self-positing I, as fossil records seem to imply that there have been times at which that Kantian or Fichtean subjective I did not exist—problematizing the attempt of these philosophers to ground all knowledge in the subjective.

For Schelling, instead, the human beings are the culmination of evolutionary processes. The *terminus* of that evolutionary process is nonetheless not the human being, as nothing prevents the emergence of "new species, equipped with new organs of thought" that are different from humans (Schelling 1830/1989: 57).

Reversing Kant's Copernican Revolution which inquired into how *mind* must be so that *nature* can appear, Schelling explores what *nature* must be so that *mind* can appear (emerge) in it:

> "For what we want is not that Nature should coincide with the laws of our mind *by chance* [as in Kant]... but that *she herself*, necessarily and originally, should not only *express*, but even *realize*, the laws of our mind, and that she is, and is called, Nature only insofar as she does so" (*SW II*, 55–6; 1797/1988: 41–2).

With "should not only *express*, but even *realize*, the laws of our mind", Schelling means that nature should not just correspond to our Kantian categories in the creation of appearances, but that nature should instead evolutionarily realize these categories in transcendental subjects over time. As "nature IS a priori" for Schelling, nature thus grounds the Kantian transcendental *ego* as well (*SW* III, 279; 1799/2004: 198).

Schelling's primacy of nature does nevertheless not entail a regression into reductive materialism. Nature is not a *thing*, conceived as bodies, but is instead *unthinged* [*unbedingt*] consisting in *forces*. *I.e.,* forces are more fundamental than bodies for Schelling, and forces are not objects (things). Schelling's conception of forces counters both Aristotle's and Kant's conceptions of nature—who both posit a nature that fundamentally consists in *bodies*. Kant's nature for example, consists in the "the sum total of all *things*" insofar they are *appearances* (*MAN*, 467; emphasis added).[89] For Aristotle too, physics is a "physics of all *things*" (*H*, 268a5–6; emphasis added).

Both Aristotle and Kant additionally exert themselves to separate physics from metaphysics. For Aristotle, physics regards primary philosophy (*M*, 1037a15–6), opposed to the metaphysics as the first philosophy (*M*, 1003a1). Aristotle envisions only two options for grounding physics, which is either a substrate theory or an element theory (*P*, 187a). Aristotle opted for the first, conceptualized in the *hypokeimenon* [ὑποκείμενον]. Kant too, after laying bare the necessary preconditions for experience in his *Critique of Pure Reason*, simultaneously restricted the domain of metaphysics in relation to the preconditions of such appearances. Physics subsequently studies appearances, but is fully separated from metaphysics as a domain.

Both Aristotle and Kant also exhibit a *sensible* conception of matter. For Kant, if transcendental philosophy wants to ground a concept of matter, the *a priori* possibility of matter must be explicated (*MAN*, 471-472). However, matter can only be reduced to moving forces for Kant, but moving forces do not appear in phenomena themselves (*MAN*, 524). The concept of

[89] Kant did develop an Aether physics of *forces* later in his life, but this work is contained in the *Opus Postumum* and never completed nor published.

matter can therefore not be transcendentally grounded. For Aristotle too, matter as substantial being is impossible (*M*, 1029a). Both philosophers therefore end up with a dichotomy between forces and bodies, due to their somatic doctrines.

Schelling's conception of forces, nevertheless, neither accords to Aristotle's substrate theory *nor* his element theory.

B. Metaphysics *in* Physics.

Schelling, contrarily to Aristotle and Kant, does not dichotomize physics and metaphysics. If "nature IS a priori", then nature must ground both physics and metaphysics—conceptualizing both in *forces*. Nature then, in that evolutionary process, "originally and necessarily grounds everything that our species has ever thought about nature" (*SW*, II, 55; 1797/1988: 41). In all thinking, and thus in both physical and metaphysical thinking, it is precisely *nature* that knows *nature*. Schelling does not reject Kant's transcendentalism, but instead considers transcendental preconditions for experience as species specific, and *evolving* over time. Kant's transcendental philosophy thus forms an important but subordinate part in Schelling's *Naturphilosophie*.

Schelling distinguishes between productivity, consisting in two primordial *forces* of nature, and their products, consisting in phenomena. The first force, matter, is consequently not sensible and not related to the (corporeal) phenomena, but is instead an *expansive force* of productivity. The second force is *constrictive*, and these two primordial forces are always in a relative equilibrium. Relative equilibrium here means that the *constrictive* force grows stronger over time, creating order within the chaotic untamed expansive force. Precisely because of the interaction of the two primordial forces, phenomena are created. However, neither force can exist fully independently of the other—an *un-constricted* expansive force would produce pure chaos, and a *constrictive* force without having matter to restrict would be impossible. Nevertheless, were the forces in a *complete* equilibrium, *stasis* [στάσις] would also occur, and no phenomena would be produced. Hence, precisely because the primordial forces continually reach new equilibria, new individuated phenomena are unceasingly produced.

Instead of Kant's dichotomization of anorgic and organic nature in his third *Critique*, Schelling understands them as a dynamic continuum. The universe is fundamentally organic for Schelling – life is an organic process that is preceded by other organic processes, such as the

formation of planets.[90] In life, furthermore, these evolutionary forces do not play themselves out linearly—there is no preordained progression in species—instead, these forces exhibit themselves on an individual basis across time. Against 18th century theories of linear recapitulation, Schelling's conception is necessarily non-linear.

Due to the *relative* equilibrium, the constrictive force progressively *informs* the *expansive* force over time. So, human agents are the outcome of an evolutionary process from lower species, under influence of the constrictive force that *informs* the chaotic expansive force. Translated to a modern scientific perspective then, the forces of evolution can be understood as counteragents against more fundamental physical forces.

Schelling grounds his conception of *forces* as a re-interpretation of Fichte's postulate of I=I. For Schelling, an unconscious moment ought to be presupposed in the forces of the self-positing I, which simultaneously grounds the I's connection to nature. The positing in the I=I already presupposes an *unconsious* positing capacity, which must be located in nature for Schelling. From the standpoint of consciousness, the Kantian transcendental *ego* is contained in a circle which it cannot exit to gain knowledge of the thing in itself [*Ding an Sich*], or nature. For Schelling however, the unconscious capacity of the I to emerge from nature, already presupposes a whole of forces that is *antecedent* to any reflexive capacity. In Kantian terms, the category of *relation* precedes the mathematical categories such as that of *quantity* and *quality*. Phrased differently, a whole of *forces* expressed through the category of community and reciprocity must *precede* the conscious ability of the Kantian transcendental ego's capacity to conclude that it contains categories in the first place. That category of community and reciprocity [*Gemeinshaft und Wechselwirkung*] is not analyzable in terms of straightforward cause and effect relationships. The productivity that precedes and creates the I must therefore be presupposed before any products (phenomena) can be analyzed in reflection.

Let us subsequently consider the consequences of Schelling's philosophy for the Environmental-Organization of Ethics.

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[90] Schelling's universe as organic whole can be considered a rudimentary version of complexity theory. Phrased in the terminology of modern science, the universe is a non-linear dynamic system, *or* complex system, even from the big-bang onward. The very formation of the universe (big bang) cannot be explained by straightforward mechanical (Newtonian) processes.

C. Schelling applied to the Environmental-Organization of Ethics Thesis.

Under Schelling's *Naturphilosophie*, the evolutionary developments of a Type-II system in the (human) brain can be understood as order developed into chaos – or, a constrictive force informing the expansive force of matter. Nevertheless, such evolutionary processes are still active. Currently, the constrictive force realizes its maximal expression inside human agents, giving them *naturalistic* and *evolved* means for self-governance that are not present in other species. A compatibilist conception of freedom is then realized in Schelling's universe through natural means, negating claims of (mechanistic) causal determinism.[91] The human brain that expresses forces, acts on fundamentally the same level of the forces in the universe—even though the brain expresses these forces at a higher level of development.

As "nature IS a priori", the traditional Kantian dichotomy between noumenal agents and their outside world, conceptualized as either appearance or thing in itself [*Ding an Sich*] falls apart. Instead, the "external" and "internal" are continuous, even though the constrictive forces of nature express themselves at higher levels in human agents compared with the outside world. In other words, human beings express the constrictive evolutionary forces at higher levels. Environmental technologies, and their side products, and agents consequently exist at the same ontological level. Technologies and their side products can nevertheless affect the predominance of the constrictive force within humans. Environmental technologies thereby become fundamental physical (and chemical) *forces* that act upon the already existing *forces* expressed through human agents.

Just as knowledge is nature knowing nature in Schelling, willing necessarily has to be an expression of natural forces as well. Augmenting the constrictive forces in human beings at the cost of expansive forces can through environmental technologies therefore increase a naturalistically embedded freedom. Far from being deterministic, this rudimentary exhibition of Schelling's philosophy thus displays how environmental technologies can be used to augment self-governance capacities. Moreover, Schelling's conception of the physics in the metaphysics entails that they are inseparable, so that the argument developed in this thesis cannot be a merely empirical argument, but must always be metaphysical as well, and *vice versa*. Nevertheless,

[91] Human beings are organisms resisting mechanistic forces outside themselves.

future research would do well to *fully* investigate this *Naturphilosophical* conception of freedom, as this current exposition was only rudimentary.

IX. Conclusion.

The first introductory section distinguished between *internal* and *external* factors that possibly affect the decisions of agents. Using F.W.J. Schelling's *Naturphilosophie*, however, it becomes conceivable that agents and their outside world no longer ought to be dichotomized. Schelling's conception of forces permitted envisioning human freedom as self-governance as a higher recapitulation of a constrictive force upon an expansive force. Under that conception, higher executive functions such as reason, planning or self-governance can be seen as *evolved* capacities of higher animals—capacities not fully available to other animals. But because no ontological dichotomy exists between human beings and their outside world, this view opens up the possibility to understand technology as partially constituting human action through a mutual interaction of *forces*.

This thesis develops two mutually supportive accounts of self-governance. The *formal* account is conceptualized in terms of structures of the will. That formal account upholds that failures of agency consist in *akrasia,* meaning that agents do not take the full set of reasons for action into account and thereby act according to desires, or weakness of will, whereby agents act against their resolutions. The main reasons for developing the *formal* account is to 1) conceptually understand failures of agency; 2) having a straightforward tool to analyze human self-governance, without having to explicate many inner workings of the brain. The subsequent *real* account, that mostly consist in the analysis of brain processes, is more complex—the *real* account understands failures of self-governance as a weak Type-II system, which is made up of higher brain regions—or an overpowering Type-I system, made up of lower brain regions. It was demonstrated that *formal* and *real* accounts are complementary and commensurate, precisely because the *formal* account claims to be naturalistically embeddable. One can thus contend that both describe and explain the same underlying processes but from different perspectives.

Ethical theories such as Kantian Deontology and Aristotelean Virtue Ethics allocate a major role to self-governance processes. Subsequently, from an Aristotelean perspective one *ought* to develop virtuous habits which solidify into character traits, by acting continuously and deliberately choosing virtuous action over vicious action. This choice entails not letting one's

desires from the vegetative and animal part of the soul rule one's actions. Kant expresses a similar conception but assumes, contrarily to Aristotle, that one can never fully win the battle to cement virtues. Kantian agents *ought* to rule their violent affects and govern their passions to prevent them from regressing into immoral behavior.

The Environmental-Organization of Ethics thesis analyzes different technologies or their side products such as artificial light, sound in the form of noise or music, air pollution and environmental toxins, and concludes that these technologies or the side products of technology indeed affect the self-governing capacities of agents in relation to the aforementioned ethical theories. Translated to the perspective of the *formal* account, these technologies can reduce *or* inflate the capacity of intentional structures of the will to regulate an agent's lower impulses. In turn, Kantian and/or Aristotelean agents ought to take environments into account.

All-in-all, it is concluded that these ethical theories would do well to also consider the possibility that environmental technologies might affect self-governance. Schelling's *Naturphilosophical* project allows one to conceive how this self-governance is possible – whatever thinks and acts inside agents, are the same forces that act outside agents, albeit, expressing different relative equilibria of *forces*. On the one hand, the recapitulation of the constructive forces allows human beings to develop self-governance capacities in the process of evolution that other animals do not fully have—but on the other hand, such self-governance capacities are still subject to natural forces as well.

Far from being deterministic, however, the Environmental-Organization of Ethics thesis rather is empowering. Agents can shape their environments to *physically* affect their self-governance capacities, for example through adjusting light and sound. As long as their naturalistically embedded Type-II system is strong enough, agents can intend to shape their environments for the better. This process is never finished, as "new species, equipped with new organs of thought [and therefore new organs of *will*]" may arise (Schelling 1830/1989: 57). New organs of thought precisely imply the emergence of new organs of *will*, as these are located in the same brain areas. Physically shaping environments yield great opportunities to increase the powers of a naturalistically embedded freedom—or as Schelling contends: "Only he who has tasted freedom can feel the desires to make over everything in its image" (*SW VII*, 351). Instead of being idealist philosophers, who want to condition their Cartesian mind independently from the world, the Schellingian realist accepts that the freedom of an emergent mind through physical

forces demands shaping that world to maximize freedom. With the Environmental-Organization of Ethics thesis, freedom has just become *real* and not merely ideal (*formal*).

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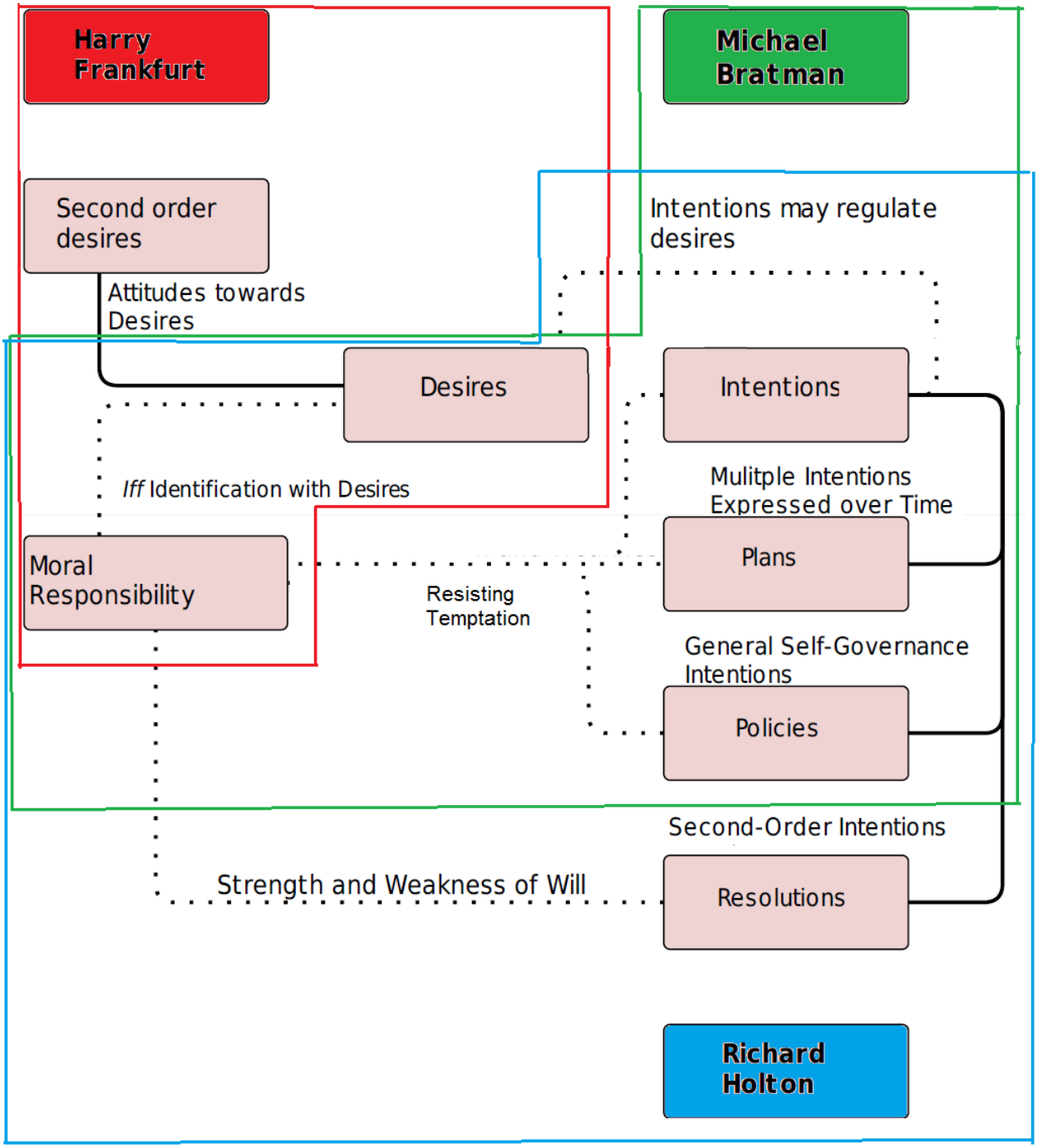
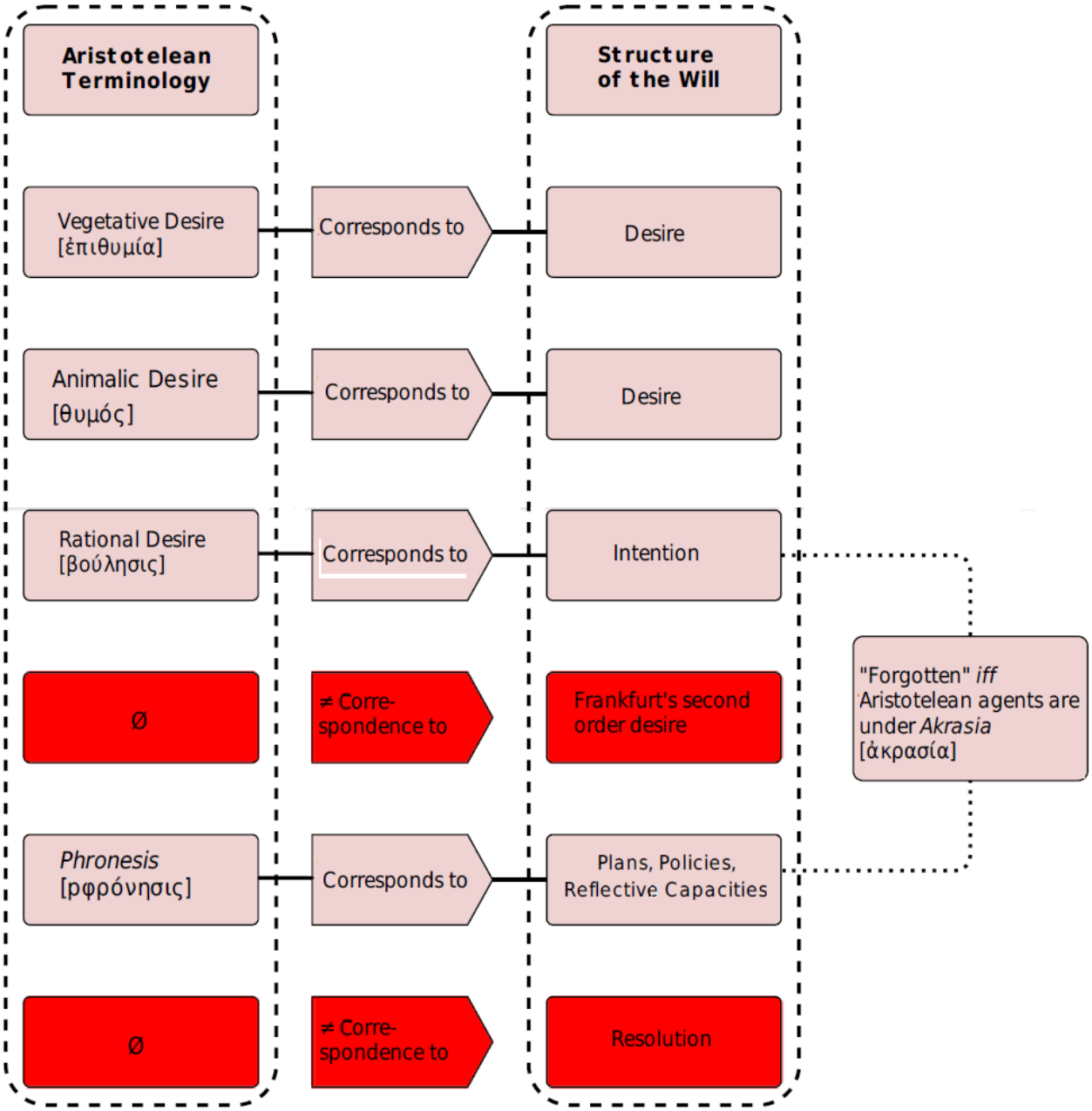
Appendix I. Structures of the Will Posited by Different Authors.



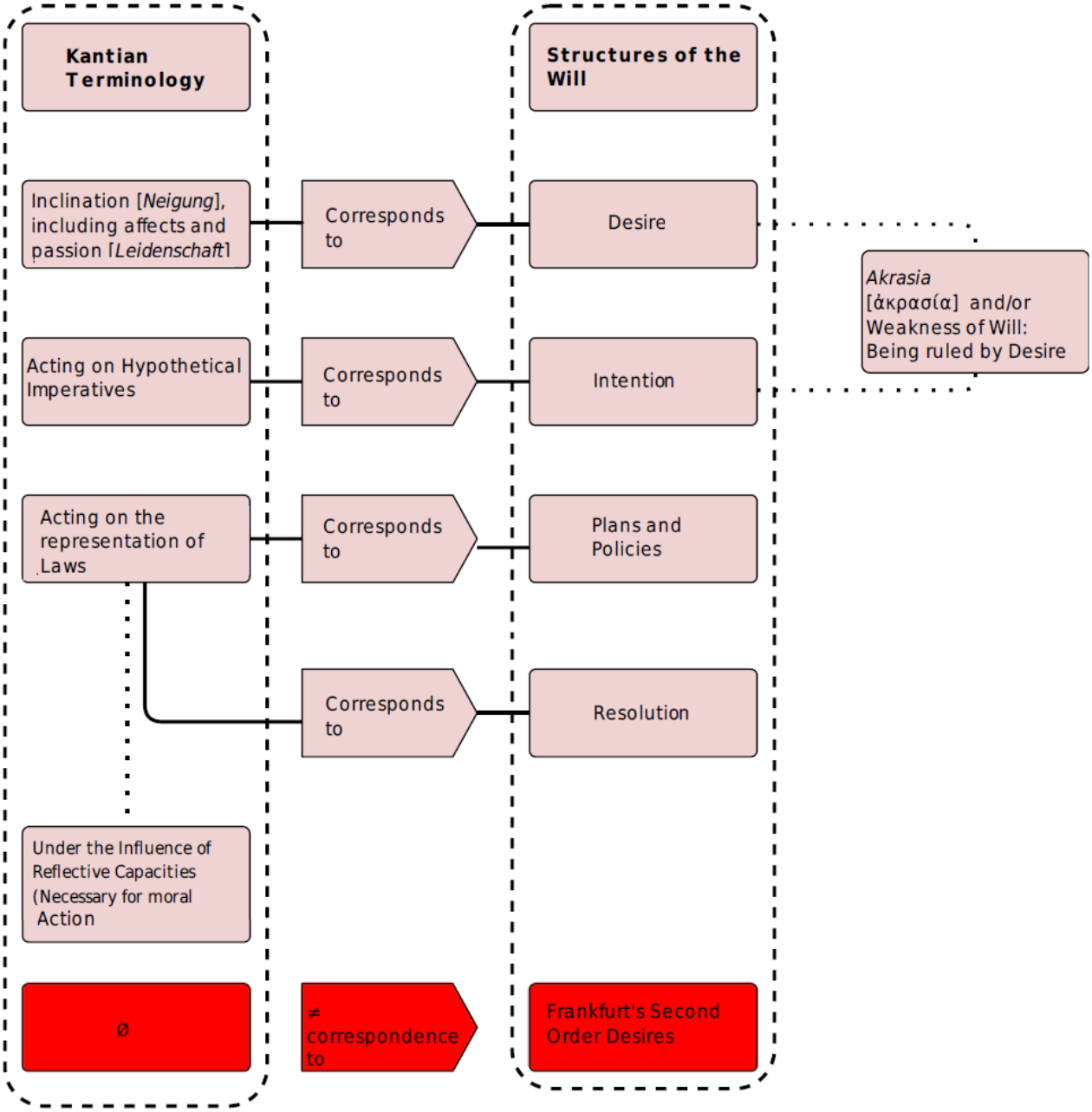
Appendix I: Schematic Display of the Different Structures of the Will. The Colored Areas denote which Structures of the Will are posited by each author.

Appendix II. Translating Aristotelean Ethics to Structures of the Will.



Appendix II: Schematic Display of the *Grosso Modo* Correspondence between the Aristotelean Conception of Agency and Structures of the Will.

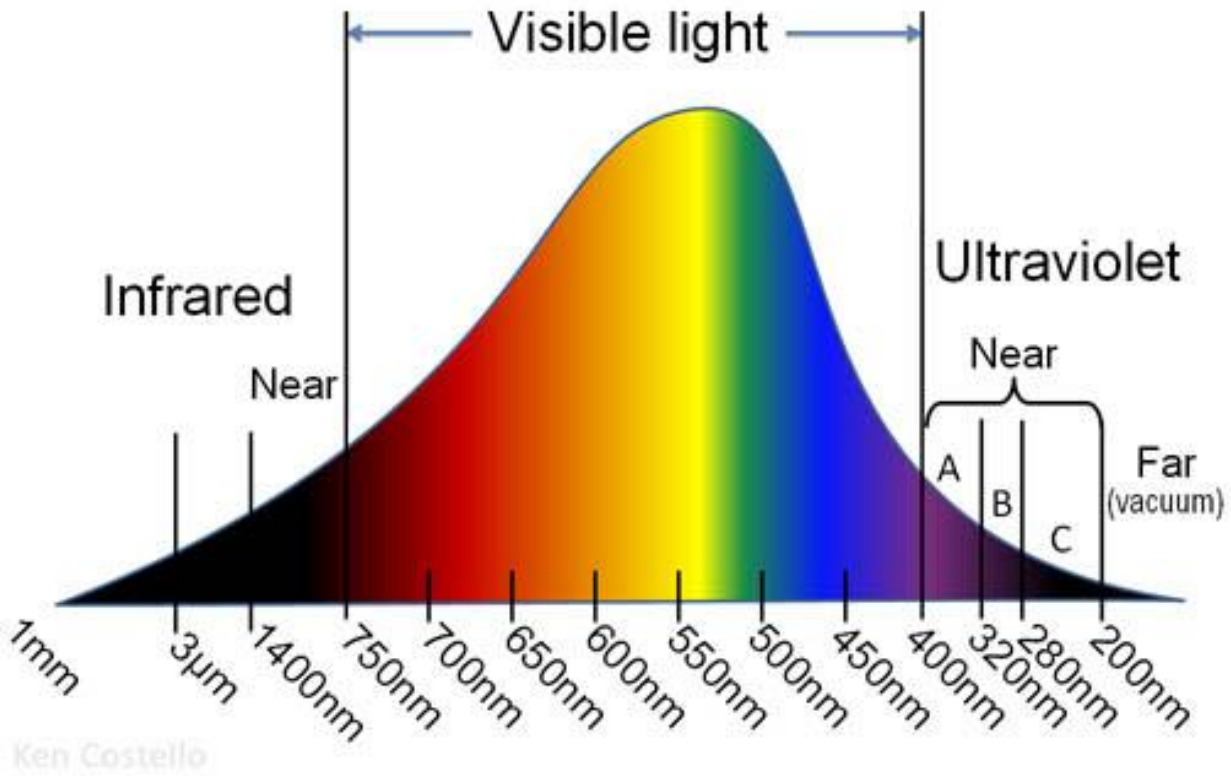
Appendix III. Translating Kantian Ethics to Structures of the Will.



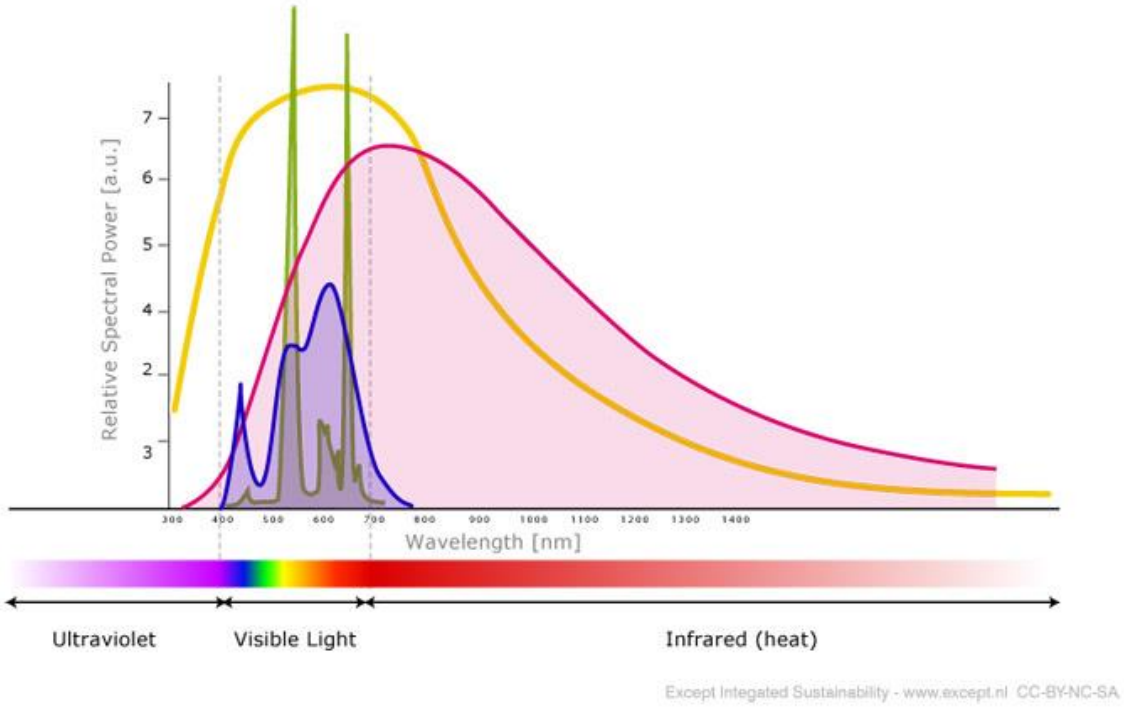
Appendix III: Schematic Display of the *Grosso Modo* Correspondence between the Kantian Conception of Agency and Structures of the Will.

Appendix IV.

A. The Sun's Light Spectrum.

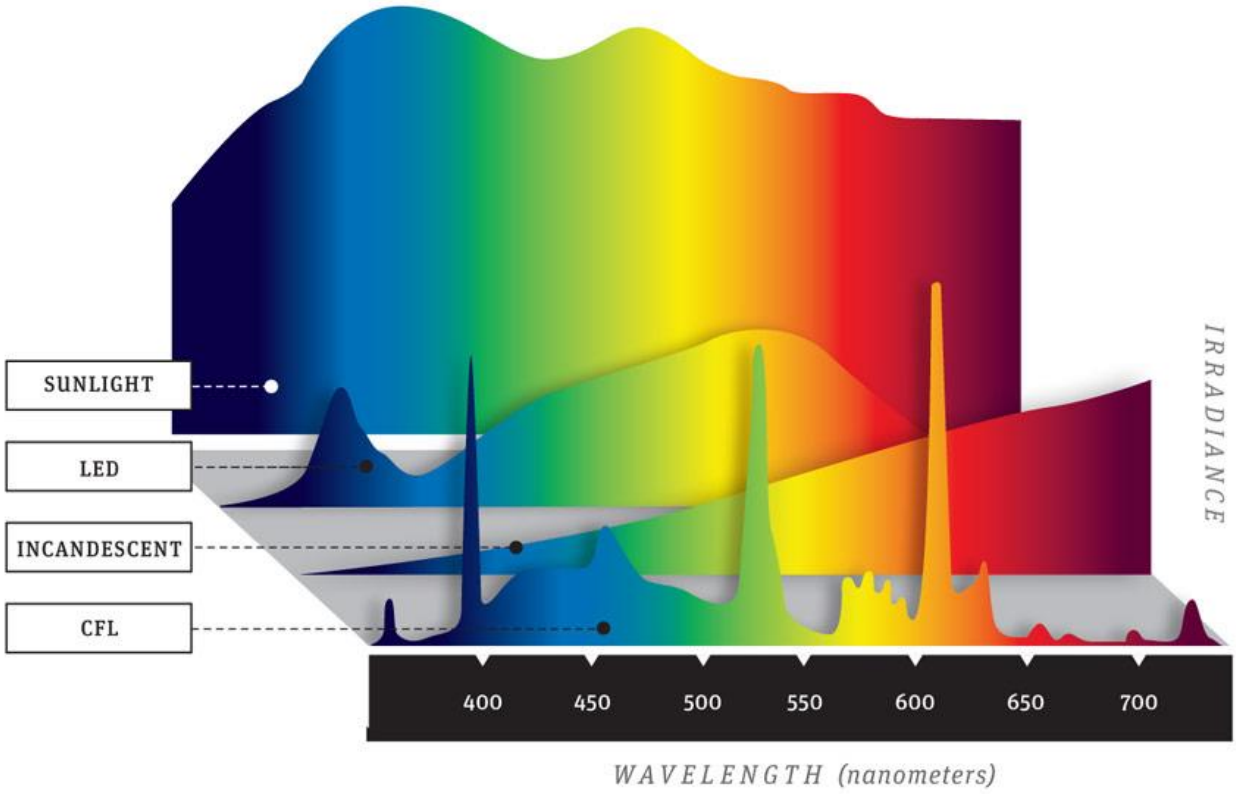


B. Light Spectrum of Different Artificial Light Bulbs Compared to the Sun.



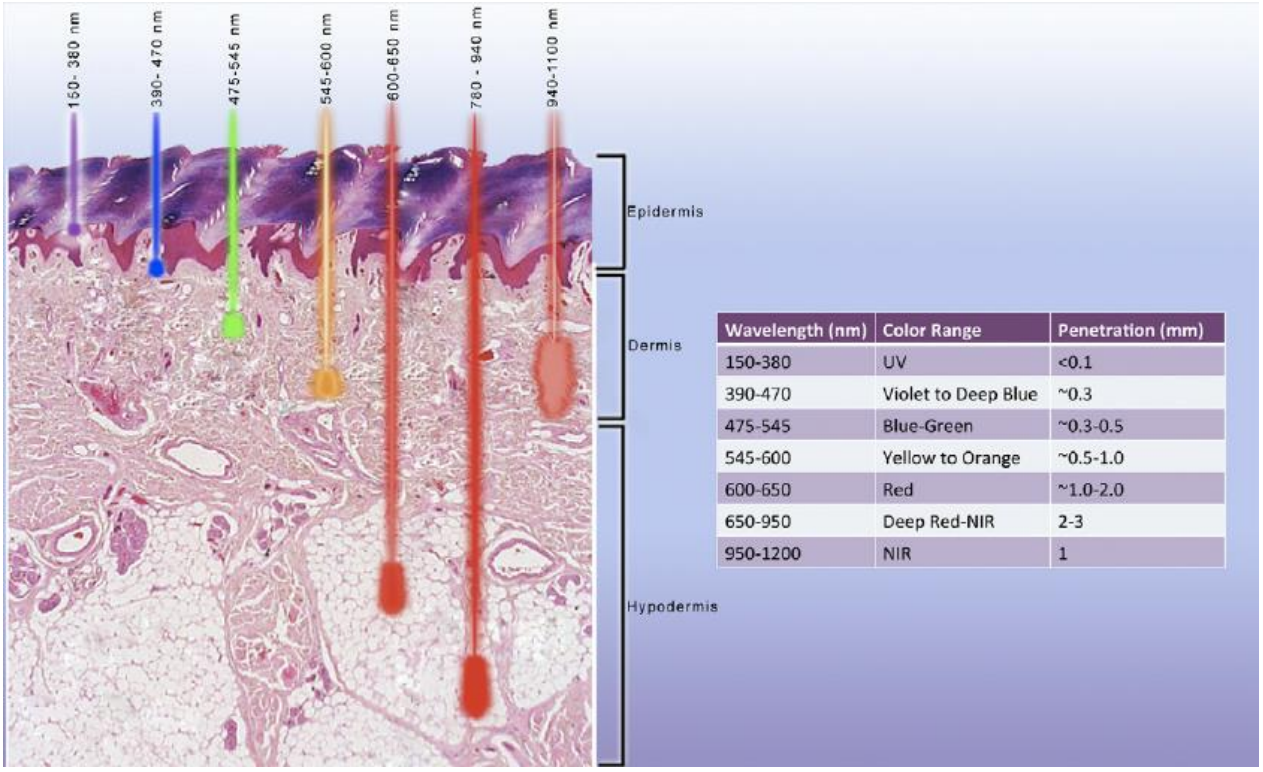
The red area under the curve denotes the light spectrum exhibited by incandescent light bulbs. The Blue area designates an LED light bulb while the green area stands for fluorescent light bulbs. Lastly, the yellow area under the curve denotes the sun's light spectrum.

Another Comparison:



(Popular Mechanics, 2011)

C. Skin Penetration by Different Light Wavelengths.



Wavelength (nm)	Color Range	Penetration (mm)
150-380	UV	<0.1
390-470	Violet to Deep Blue	~0.3
475-545	Blue-Green	~0.3-0.5
545-600	Yellow to Orange	~0.5-1.0
600-650	Red	~1.0-2.0
650-950	Deep Red-NIR	2-3
950-1200	NIR	1

(Avci, Gupta & Sadasivam, 2013)