In search for a theory for the Five Factor Model – why five and why these five?

Abstract

This paper seeks to open a new line of discussion in the fields of evolutionary and personality psychology. The question is posed and explored as to whether there could be a formal connection between Maslow's Hierarchy of Human Needs and the Five Factor Model. If this proposition were found to be valid, then it could provide an explanation for the long-standing mystery of the origins and meaning of the different personality traits as have been identified empirically, giving rise to the Five Factor Model. It would then allow for further interrogation of both the Needs and Factors to enable us to better understand both constructs and their roles in explaining human behaviour, motivation and influences on people's well-being.

Key Words: **Maslow's Hierarchy of Human Needs, Five Factor Model, Evolutionary Psychology, Evolution of Personality, Personality Psychology**

1. Introduction

Both Maslow's Hierarchy of Human Needs and the Five Factor Model contain five components: five needs, five spectra of personality traits. Is this just coincidence? First a quick summary will be given on each of these constructs. Next, the needs framework is reviewed to amend some evident inconsistencies originally embedded in Maslow's theory, thereby enabling his model to be utilised in a social context. A pathway between these two areas of thinking (needs and factors) is then explored, setting out how the existence of a basic set of organism needs might have influenced the evolution of human personality types. If there were to be a connection between these two areas, then this would facilitate improvement of each of them, providing a theoretical underpinning for the Five Factor Model, which might in turn enable refinement of our understanding of both needs and personality traits. Finally, a discussion is provided on how this might be explored further.

1.1 Maslow's Hierarchy of Human Needs

In 1943, Abraham Maslow published his remarkable framework, now commonly known as Maslow's Hierarchy of Human Needs (Maslow 1943) (see Box 1). He initially formulated his ideas through observation of Rhesus monkeys and then applied them to the human domain. His theory is a foundational concept within the discipline of Humanistic Psychology, proving to be a very popular approach to understanding human motivation. For many decades now, it has been core curriculum at management schools world-wide.

Box 1 – Maslow's Hierarchy of Human Needs

Maslow proposed that people have five fundament needs, which exist in a loose priority order.

LEVEL 1 Material needs

The need to breathe, drink and eat to survive, which are undeniably crucial requirements. Maslow also considered the needs of shelter, warmth, and sex to be Level 1 needs. Whether some of these additional needs, such as sex, are as fundamental as he suggests is open to debate.

LEVEL 2 Safety and Security needs

The need to keep safe from predators and external threats – bodily safety and protection from violence and theft. Maslow also considered that the security aspect of this need included job and financial security and the ability to save money for the future. Maslow suggested that emotional stability, well-being, and health insurance were relevant at this level. These latter items are, however, at odds with the structure of his needs framework, as will be explored further.

LEVEL 3 Social and Belonging needs

The need to be sociable and intimate, to experience a sense of belonging. This can be achieved through being a member of social groups and a local community. But, as will be explored below, is membership of a social group really a core requirement, or a way of meeting an underlying need?

LEVEL 4 Self-Esteem Needs

He interpreted esteem as the need to feel you've mastered something, achieved independence, and learned a skill, along with the importance of gaining recognition and respect from others. His interpretation of the Level 4 need creates a logical inconsistency in the structure of his framework by confusing a real need with the benefit that arises from satisfying an underlying need, which will be discussed further and possibly confused with the Level 5 need.

LEVEL 5 Self-Actualisation Needs

Maslow spent a significant amount of time in his later career trying to pin down what he

meant by Self-Actualisation Needs. Essentially, he viewed it as realising your potential and seeking personal growth – "to become everything one is capable of becoming".

The idea behind the hierarchy is that people necessarily prioritise their lower-level needs before focusing time and attention to their higher needs. However, Maslow emphasised that this was not a strict hierarchy: someone doesn't drop everything else the moment they experience some hunger. But generally, people will prioritise the way they live their life according to this hierarchy.

For many years, a key criticism of Maslow's Hierarchy has been the lack of empirical evidence (Wahba and Bridwell 1976, Neher 1991, Hofstede 1984, O'Connor and Yballe 2007). It has proven difficult to demonstrate that these are the only key experienced needs or that they exist in the priority order identified by Maslow. Other researchers have proposed a variety of alternatives to Maslow's Hierarchy (Alderfer 1969, McClelland 1961, Deci and Ryan 1985, Herzberg et al 1959, Kenrick et al 2010). But none of these have gained the same level of traction.

The challenge with proving the existence of any set of needs, or hierarchy thereof, may be in part because civilisation, especially in developed countries, has been very successful in enabling people to meet their needs. So, it is difficult to empirically tease out the validity of the Needs Hierarchy when all survey participants can readily grab a snack whenever they want, or already have a job and a reasonably secure income. The hierarchy only becomes fully apparent in extreme circumstances (as evidenced in television productions like "Alone" (History Channel), where contestants necessarily prioritise eating over building a shelter, before looking after their health, etc). That said, relatively recent economic research

(Taormina and Gao 2013, Tay and Diener 2011) across large survey cohorts has provided some support for the existence of a needs hierarchy of the kind envisaged by Maslow and indicated that it is invariant across many cultures.

1.2 Five Factor Model (also known as the Big Five)

The Five Factor Model has a history going back to the 1930s. It originated from lexical analysis, seeking to identify traits from grouping words which describe human personalities. It gained prominence during the 1980s and 1990s through research by leading psychologists Paul Costa and Robert McCrae (Costa and McCrae 1985), who initially suggested three main factors. Facilitated by computers and countless surveys, researchers have honed the statistical analysis of datasets and now construed there to be five dimensions to personality (see Box 2) (McCrae and Costa 1987, Costa and McCrae 1992, McCrae and Costa 1997, Digman 1990, Saucier and Goldberg 1996, McAdams 1992). This has been rigorously tested over recent decades and reached a significant degree of consensus within the psychological sciences research community (John et al 2008, Soto and John 2017).

Box 2 – Five Factor Model of Personality Traits

The Five Factor Model suggests that there are five spectra to human personality. All people sit somewhere on these five spectra, such as the scale from Introversion to Extraversion. The five factors are often referred to with the acronym: OCEAN.

Openness to Experience

This trait features characteristics such as imagination, curiosity, and a broad range of interests. Individuals high in Openness are typically more open to new experiences, ideas, and unconventional values. They tend to be more creative and willing to explore novel ideas

and activities.

- High Openness: Creative, imaginative, curious, open-minded, adventurous, and intellectually curious.
- Low Openness: Practical, conventional, and preferring routine.

Conscientiousness

Conscientiousness involves a high level of thoughtfulness, good impulse control, and goal-directed behaviours. Highly conscientious individuals are organized, mindful of details, and reliable.

- High Conscientiousness: Organized, disciplined, diligent, reliable, and goal-oriented.
- Low Conscientiousness: Spontaneous, flexible, and sometimes careless.

Extraversion

Extraversion is characterized by excitability, sociability, talkativeness, assertiveness, and a high level of emotional expressiveness. Extraverts enjoy being around people and are often perceived as energetic and enthusiastic.

- High Extraversion: Sociable, outgoing, energetic, assertive, and talkative.
- Low Extraversion (Introversion): Reserved, quiet, and independent. Introverts tend to be more solitary and may find social interactions draining.

Agreeableness

This trait reflects individual differences in general concern for social harmony. Agreeable individuals value getting along with others and are generally considerate, kind, generous, and trusting.

- High Agreeableness: Compassionate, cooperative, trusting, and helpful.
- Low Agreeableness: Competitive, critical, and sometimes antagonistic.

Emotional Stability (opposite of Neuroticism)

Neuroticism involves the tendency to experience negative emotions, such as anger, anxiety,

or depression. It also includes emotional instability and a propensity to experience stress.

- High Neuroticism: Emotionally reactive, anxious, moody, and easily stressed.
- Low Neuroticism: Emotionally stable, calm, and less prone to stress.

With the identified personality traits having been deduced through empirical analysis, the most significant criticism of the Five Factor Model is that it is absent of any underlying theory (McAdams 1992, Mischel 2004, Eysenck 1992, Widiger 2017). Various attempts have been made to explain the origin of personality traits generally (Buss 1999, Buss 2009, Buss and Penke 2015, Nettle 2006, Nettle 2007, DeYoung 2010, Canli 2004, John and Srivastava 1999, Tooby and Cosmides 2005). But none have so far been able to shed light on 'why specifically five and why these five' (Block 1995, Soto and Jackson 2020).

Given the lack of theory underpinning the Five Factor Model, the detailed definitions of each of the personality traits must be treated with care. The personality traits cannot otherwise be derived or verified in any other way. As a consequence, the detailed descriptions of the traits given by researchers are often tailored for different contexts or to support researchers' own areas of interest (McCrae and Costa 2008).

2. Methodology

2.1 Making the human needs framework internally consistent

So, Maslow's Hierarchy of Human Needs is a theory, which has been difficult to prove with empirical analysis, whereas the Five Factor Model has arisen out of empirical research but has no underlying theoretical basis. Before looking at how these two models might connect, it is first necessary to review Maslow's theory and iron out some evident internal

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inconsistencies.

According to the Oxford English Dictionary, the word 'need' suggests a requirement that can be satisfied through obtaining something external to the self or carrying out an action in the real physical world to enact some change for a person's benefit. Maslow himself interpreted a need to be a state of deprivation or lack which motivates behaviour (Maslow 1954). In that it relies on some physical action to achieve resolution, the concept of 'need' is not something that is static. Someone is not, say, permanently hungry; rather they feel hungry, so eat something, thereby temporarily assuaging the sensed need. While they are no longer hungry, they can focus their attention on addressing their other needs.

Each need should therefore better be seen as a relatively simple feedback process: I sense that I need something, so I act to obtain what I perceive I need; if successful, I then determine that my need is, at least temporarily, resolved. In practice, people detect their needs through urges, such as feeling hungry and thirsty (Maslow Level 1) or feeling anxious and stressed (Maslow Level 2). They experience each of these urges both mentally and physically (Ombrato and Phillips 2021, Parsafar and Davis 2018). In experiencing urges, people are motivated to try to assuage them through action – say, find food. In successfully addressing an urge, a person benefits accordingly through the emotion of happiness and an outcome in terms of their sense of wellbeing (LeDoux 1996, Diener 2008). When repeated regularly, such behaviours influence their attitude towards themselves and the world around them (Bern 1972, Ajzen 1991).

When seeing needs as processes, it quickly becomes apparent that Maslow embedded some terminological inconsistencies within his Needs Hierarchy, which have major implications in

terms of how it can be used. The key disparity arises from whether a need can be met by a person acting alone or through social interaction, where the originating need should be independent of the way it is subsequently resolved. The Material Needs can clearly be resolved both ways – picking blackberries or going to a shop. Likewise, the Safety and Security Needs could be met either way – building a hut for protection, alone or in a group. But, given the way Maslow constructed his higher needs, they are all wholly dependent on social interaction and cannot be achieved by someone through their own individual actions. By way of example, you can't have a Sense of Belongingness without there being a community to belong to, which is reliant on others accepting you into that community.

A good check, on whether something is a 'need', is 'can you go out and purchase a resolution to said need?': buy some food, buy a home, purchase some healthcare, etc. In the modern consumerist world, anything required by anyone is capable of being bought, somewhere, somehow. But you can't simply buy a Sense of Belongingness, nor Self-Respect. This raises the question as to whether Maslow's defined higher needs should better be construed as outcomes of meeting needs, rather than the needs themselves. Which raises the question: what are the underlying needs?

Table 1 provides suggestions as to what the real needs are and other key elements for each step of the needs feedback process. This shows how Maslow's higher needs arise from resolution of needs. Whilst it is clearly beneficial for someone to gain these states (Sense of Belonging, Self-Respect, etc), they cannot be the underlying needs. The other boxes in the columns on the right of Table 1, those not originally deduced by Maslow, should be deemed tentative suggestions at this point.

Table 1 – Urges, Actions, Responses and Consequences (* = needs as determined by Maslow)

	Urge	Action or Thing Required (Need)	Initial response from success (happiness)	Individual Consequence (improvement to self …)	Social Consequence (where need has been resolved through social interactions)
1	Physical: hunger or thirst from lack of energy / water / money Mental: existential angst	***to obtain food and water (foraging, hunting or purchasing)**	feeling of elation / exhilaration (*see "Alone" TV production*)	**self-identity** capacity to look beyond the present thirst/hunger, to focus on other aspects of life	**sense of group identity** accepting of those others who facilitated the self's on-going survival
2	Physical: biological stress responses (heart rate/blood pressure, etc) Mental: stress / anxiety / fear	***to make a safe space and/or secure an on-going supply of food or money (requires physical action)**	feeling of relief / achievement	**self-assuredness** capacity to invest time and effort arising from perspective that working hard can achieve benefits and is worthwhile	**sense of camaraderie** trusting that others will contribute effort to make things happen and secure the future
3	Physical: injury or poor health (or perceived poor health) Mental: worry / discontent	to rest, recuperate and recover, and to provide to self or receive healthcare from others	feeling contented / relaxed / healthy	**self-worth** capacity to dedicate effort towards health and ensuring environment is conducive to good health	***sense of belonging** gaining faith that others will reciprocate good deeds and willingness to help others
4	Physical: constrained from being unable to move Mental: frustration from insufficient information	to obtain information about the physical or social surroundings (to enable making decisions)	feeling informed and able to make decisions (locus of control)	***self-esteem** **self-respect** capacity to make decisions and effect change, to achieve autonomy	**sense of inclusion** belief that others are capable of telling the truth and that it is possible to influence others
5	Physical: fidgety Mental: boredom from lack of stimulation	to master a skill (say, learning to play music), to work towards gaining an expertise	feeling competent immersion 'flow'	***self-actualisation** **self-confidence** capacity to learn, then encourage and mentor others to succeed	**sense of recognition** gaining sensation of harmony and unity with others / willingness to fully depend on others

This proposed revision to the Human Needs model (as shown in Table 1) aligns it better with thinking in the biological sciences. A founding assumption of life history theory is that organisms experience key life cycle stages, primary ones being: survival, growth, and maturation/health maintenance (Stearns 1992). Survival requires finding food each day, growth depends on continuity of daily food so as to divert sufficient energy to growing, and continued health is dependent on focussing enough time and energy on regular health maintenance (grooming, etc). An organism, which successfully addresses and progresses through these life cycle stages, can reproduce and pass on its genes. This provides further corroboration for the lower levels of the Human Needs hypothesis. A revised set of labels for the set of needs is provided in Table 2.

Table 2 – Revised Hierarchy of Needs

	Maslow's Original Terminology	**Revised Labelling of Needs**
1	Material	Energy/Material
2	Safety/Security	Safety/Security
3	Belongingness	Healthcare/Nurture
4	Self-Respect	Information
5	Self-Actualisation	Expertise

Maslow originally constructed his framework as a theory of human motivation. It should influence, if not dictate, how people use their time. Further, the ease by which someone can satisfy each need is likely to dictate how much time they dedicate towards it, clearly prioritising those lower needs. If the proposed hierarchy is valid, then resolution of the full complement of needs should occupy all of someone's available time (24-hour day, 7-day week). This revised approach does exactly that: people divide their time between eating and shopping (Level 1), working to secure an income (Level 2), resting, sleeping, keeping their

environment in a healthy state, and socialising (Level 3), catching up on news, culture and social media (Level 4), and practicing some skill or appreciating someone else's expertise (Level 5). For most people, there's precious little time left outside of doing all that.

All of these revised needs can be carried out individually or through social interaction, where Maslow's interpretations of the higher-level needs can be seen to arise from successfully interacting with others to meet the respective underlying individualistic needs:

- self-worth can be gained through effort nurturing the self (or received by others), and the feeling of being treated as having value - a **sense of belonging** emerges through socialising and participating in reciprocal nurture/healthcare related interactions with friends, family and the community;
- **self-respect** can be gained through having reliable information on which to make decisions - when courses of action prove to be successful, an individual obtains a locus of control and sense that they are capable of making good decisions and can influence their own future; and
- **self-actualisation** can be gained from becoming proficient in some skill.

2.2 Comparison between Needs Framework and Five Factor Model

Having set out the needs as a set of processes and better defining the underlying needs, it is possible to predict how people might be expected to behave and their corresponding attitudes in circumstances when they are not satisfactorily meeting their needs compared to when they have strongly satisfied their needs (see Table 3).

Table 3 – Consequence of not meeting / meeting needs

	Revised Needs	Not meeting need	Strong satisfaction of need
1	Energy/Material	Existential angst, highly focussed on immediate task to obtain food and water – very self-focussed	Feeling of elation and happiness, ready to embrace the world – everything feels good
2	Safety/Security	Feeling stressed and fearful about the near future, striving to improve one's own personal situation	Feeling relieved and achieved something. Thankful to those who have contributed to success.
3	Healthcare/Nurture	Feeling ill and very worried about own health, wanting to spend time and energy on self to enable healing	Feeling relaxed and contented, with a sense of gratitude to anyone who has helped take away the worry
4	Information	Feeling excluded and lacking information, frustrated at not being in control	Feeling in control and 'in the loop', able to influence the way things happen
5	Expertise	Feeling bored and unsatisfied, direction-less	Motivated and self-directed, confident in one's abilities and willing to learn more

Looking at the descriptions in Tables 1 and 3 and then comparing these to the five personality traits in the Five Factor Model, an initial suggestion is made regarding correlation between the two models, as shown in Table 4.

Table 4 – Needs and Traits

	Revised Need	Factor
1	Energy/Material	Introversion/Extraversion
2	Safety/Security	Disagreeableness/Agreeableness
3	Healthcare/Nurture	Neuroticism/Emotional Stability
4	Information	Not Conscientious/Conscientious
5	Expertise	Not Open/Open

To support this suggestion, Table 5 provides summary descriptions of the personalities

associated with the two ends of the spectra for each trait.

Table 5 – Needs compared against Low and High Scoring Personalities

	Factor	Need	Low	High
1	Extraversion	hungry v well fed	reserved, quiet, and independent	sociable, outgoing, energetic
2	Agreeableness	insecure v secure	competitive, critical, and antagonistic	cooperative, trusting, and helpful
3	Emotional Stability	unhealthy v healthy	emotionally reactive, anxious and worried	emotionally stable, calm, and less prone to stress
4	Conscientiousness	uninformed v informed	spontaneous, flexible, and sometimes careless	organized, disciplined, diligent, and goal-oriented
5	Openness	not gained any expertise v experience learning a skill	practical, conventional, and preferring routine	creative, imaginative, curious, open-minded

The personality descriptions appear to provide a very approximate fit against the attitudes and behaviours that one would expect to arise from poor and good levels of satisfaction of the five needs from Maslow's Hierarchy. It is by no means a perfect fit. But there does seem to be a degree of correlation. At face value, this appears to provide a slightly positive answer to the question posed at the outset of this paper. There could indeed be construed to be a direct correlation between the five needs and five traits. But, if this were the case, it raises further questions, in particular:

- Neurotic people, by way of example, are not necessarily people always in poor health. So, why would some people express a personality corresponding to being in poor health when, in fact, they are sometimes in fine fettle. Contrastingly, some people with serious ailments might still express a personality of being emotionally stable. The same query can be asked across all the personalities: for instance, feeding an introvert may make them less grumpy but does not automatically turn them into an extravert.
- Twin studies have indicated that the Five Factors arise from a combination of nature and

> nurture (about 50% genetic contribution and about 50% lived experience) (Bourchard et al 1990, Bourchard 1993, Loehlin 1992, Jang et al 1996, Bouchard and McGue 2003). The above direct correlation between personalities and degree of satisfaction of needs would suggest that some people are born behaving as though they are permanently in poor health, regardless of their actual circumstances. This makes no sense. Why would evolution give rise to a spectrum of genes making some people act as though they are in, say, good health and others forever thinking they are in poor health.

If as suggested above, there may be some form of connection between needs and factors, but probably not a direct one, the next question is how might a correlation arise? To answer this, it is necessary to turn again to the needs model and consider how it functions within a social context.

2.3 Operationalising the needs framework in a social context

Inside the family home, people interact with each other across all their needs (eating, pooling their money, nurture, etc). However, in the outside world, most interactions can be conceived as specific to each of the needs, giving rise to Ideal Type Interactions. (The notion of the Ideal Type is borrowed from Max Weber's concept of Ideal Type Actions (Weber 1949, Weber 1978) – in this case applied to Interactions and not just Actions.) Table 6 lists out some typical Ideal Type interactions. Where people interact across all their needs, such as in the family, then the resultant relationships represent a combination of Ideal Types. Likewise, someone's relationship with work colleagues may progress beyond just working and become more friendly, combining both Level 2 and Level 3 Ideal Types.

Table 6 – Typical examples of Ideal Type Interactions

	Needs (revised)	**Ideal Type (Cooperative) Interactions**	
		Modern Day	**Historic (Tribal)**
1	Material	shopping	foraging and hunting in a group
2	Safety/Security	working to secure an income	building things, such as tools for hunting, huts for protection, etc
3	Health	socialising with friends and relations or going to the doctor	nurture interactions, such as grooming, within family and wider tribe
4	Information	browsing social media and internet, participating in discussion forums	gossip in the tribe and actively exploring physical surroundings
5	Expertise	learning from a mentor	learning from a mentor

Switching to a completely different scientific field, game theory has been formulated over the last fifty years to analyse interactions both amongst humans and in the natural world. Within game theory, it is now well-established (Maynard Smith 1982, Nowak 2006) that for any social scenario there are four distinct ways in which agents can interact. These are hereafter referred to as Forms of Interaction and described below in relation to Maslow's Level 1 needs:

1) **Passive Competition** (also denoted selfishness or latent competition) applies where one agent acts independently without any consequences, but their behaviour is in any event detrimental to another party. This equates to the selfish party consuming a limited common good (using economic interpretation of the term *common good*), reducing its availability to all others (say, foraging for food thereby depleting availability for others).
2) **Active Competition** (also referred to as spite or conflict) corresponds to circumstances where there is a potential disadvantage from the chosen course of action by each party. Typically, this represents deciding whether to enter into conflict (such as seeking to steal food) with the risk of injury. However, the reward of being able to eat may make the risk

worthwhile despite the possible consequence.

3) **Active Cooperation** happens where parties actively choose to cooperate because they can see a benefit arising. This can be expressed through sharing a limited common good or direct reciprocation. This results in both or all parties obtaining a guaranteed smaller immediate gain (dividing the resource between them) than each could potentially have achieved from a competitive course of action.
4) **Passive Cooperation** is often referred to as indirect reciprocation or altruism, where one party seemingly contributes to another's benefit or a wider social good without an obvious immediate return. However, more detailed analysis suggests (Trivers 1971, Alexander 1987, Nowak and Sigmund 2005) that such behaviour is usually done in the expectation that a return may still be achieved, albeit delayed. In the human domain, this interaction is primarily observed in relation to Maslow's Level 1 needs as exchange (trading goods for money), where the money can then be used later to purchase food (recognising that the origin of money was simply a means to record transactions (Mitchell-Innes 1913, Ingham 2004)).

These Forms of Interaction can be applied to each of the Ideal Type interactions. Table 7 provides example interactions for each scenario.

Table 7 – Modern-Day Examples of Forms of Interactions for each Ideal Type

	Needs (revised)	**Forms of Interaction**			
		Competitive		**Cooperative**	
		Passive	**Active**	**Active**	**Passive**
1	Material	foraging alone	stealing food	sharing food	exchange / trade
2	Safety/ Security	making something alone	taking territory/ dominating	sharing work / territory	division of labour in a team

3	Healthcare/ Nurture	brushing own teeth	expecting healthcare without reciprocation	reciprocal nurture / grooming	providing assistance in the community
4	Information	sourcing information alone	seeking to dominate information space	sharing information/ pooling knowledge	exchange of information
5	Expertise	learning a skill alone	expecting mentoring without reciprocation	reciprocal mentoring	participating in, say, an orchestra

For any interaction that two or more people have, game theory suggests that they are capable of being either competitive or cooperative. The choice of being competitive or cooperative is not just a modern phenomenon; it is something which has existed throughout our evolutionary history. Whilst human beings have evolved to survive in groups for millions of years, going back far enough along our evolutionary tree, we existed as lone animals, fiercely competing against each other for, say, fruit in the jungle. And though we have since learnt to live cooperatively, an explicit assumption underpinning Darwin's theory of natural selection (Darwin 1859) is that we each remain individuals who are innately competitive.

2.4 Evolution of Competitive and Cooperative Behaviours

Building on the concept of Ideal Type interactions and the ability to compete or cooperate in relation to each, the following describes how this might have played out during our evolutionary history. Imagine a troop of early apes in the jungle, one large family, interacting together as a unit.

Level 1. When food was plentiful, then one can imagine the apes expressing their innate competitiveness by spreading out in the treetops, each picking fruit alone. However, when scarce, to survive the apes would have been forced to group together and share the picked fruit. Those who were happy to interact closely with their peers and who behaved peacefully around food would have fared better in these situations. This favoured those behaving-like

extraverts. When sharing with others, these extraverts not only felt elated from successful interactions, but they also obtained the energy they needed to survive.

Level 2. To be assured of a continuous supply of food, the apes would have had to defend a territory, like modern-day chimpanzee troops do. Such troops are hierarchical. There is constant competition within them for higher ranking positions. In the absence of any external menace, this internal competition would have dominated. However, in the presence of competing neighbouring troops, then their territory would be threatened. The group of apes who were better able to fight together as a unit, standing side-by-side to defend their territory, would have fared better. In the presence of external threats, then evolutionary selection would have favoured more agreeable apes. At other times, the highly competitive apes, climbing to the top of the hierarchy, would have been more successful at passing on their genes.

Level 3. Within any troop of apes, individuals would have a choice between competitive or cooperative reproduction. The former would manifest as individuals focussing all their surplus energy (after finding food and defending territory) on rearing their own off-spring. However, when population pressures were intense across the overall landscape, then those whole troops which internally cooperated in the rearing of young would have survived better. In these more cooperative social environments, there would have been more grooming between adult apes and shared nurture of off-spring. A comparison can be found today between chimpanzees, in whose troops infanticide occurs intermittently, versus bonobos, which are known for a great deal of mutual grooming and never carry out infanticide (de Waal 1998, Wrangham and Pilbeam 2001). At times of more intense external competition, those who are more willing to support others would have fared better.

Level 4. When population pressure amongst whole troops forced some out of the jungle into unfamiliar territory, then a new survival dynamic would have come into effect. Without having grown up in such new terrain, each individual would be reliant on either self-exploration or acquiring information from others to deduce where food could be found and dangers avoided. For any individual ape, if they were constantly being lied to by their peers, they would have little incentive to be honest and would find themselves not having the right information to make decisions unless they found it out themselves. It would therefore be challenging to make plans, forcing them to be spontaneous and flexible. In contrast, within those troops, where apes learnt to pool knowledge, then each agent would have access to good quality information and from this make strategies, plans, and decide on courses of action. Those troops which learnt to honestly share information amongst group members would have been more likely to survive in their new environment.

Level 5. Perhaps now progressing from apes to a tribe of early hominids, consider the experience of a child born into two different groups. That lucky child born into a group, where nurture has extended beyond just healthcare and mental well-being to fully fledged mentoring to learn new skills, would have been exposed to a variety of options within the tribe: learn to forage, to stalk and hunt, to craft and so on. Or perhaps they learnt all of these. This would have required an open mind to gain these various skills. In a troop, where such mentoring did not occur, then a child would have been more inclined simply to focus on his or her other lower needs – finding today's food, avoiding predators and some mutual grooming.

2.5 Confluence of Needs and Personalities

The above scenarios have been used to provide a logical explanation for the proposed

correlation between needs and personalities set out in Table 4. The proposition is that the set of personality traits equate to different approaches to meeting respective needs: competitively or cooperatively. From an evolutionary perspective, different attitudes and behaviours could have been selected for in different circumstances and would have been embedded into our genes. This is described further in Table 8. This seeks to make explicit the difference between success/failure to meet a need as compared to meeting that need through competitive or cooperative interactions.

Table 8 – Correlation between approach to needs and personality types

	Human Need	**Five Factor Trait**	**Discussion**
1	Energy/ Material	Extraversion	In satisfying their Level 1 need, people gain, maintain and strengthen their self-identity – literally their existence as a unique living entity (id-entity). It gives them the capacity to look beyond the immediate present moment and think about their other needs. Failure to meet this need leads to imminent death; before that, it will give rise to total pre-occupation on food, existential angst and lethargy. If someone is inclined to meet this need competitively, then they will tend to separate themselves from other people, effectively preferring to forage or hunt alone. This manifests as an introverted personality type with a strong personal identity. In contrast, someone who prefers to obtain their food through cooperation will embrace interacting with other people – they effectively see other people as their source of energy, which is why they feel so energised from socialising. They will tend to merge their own identity into that of the wider group and express all the behaviours that we normally associate with extraverts.

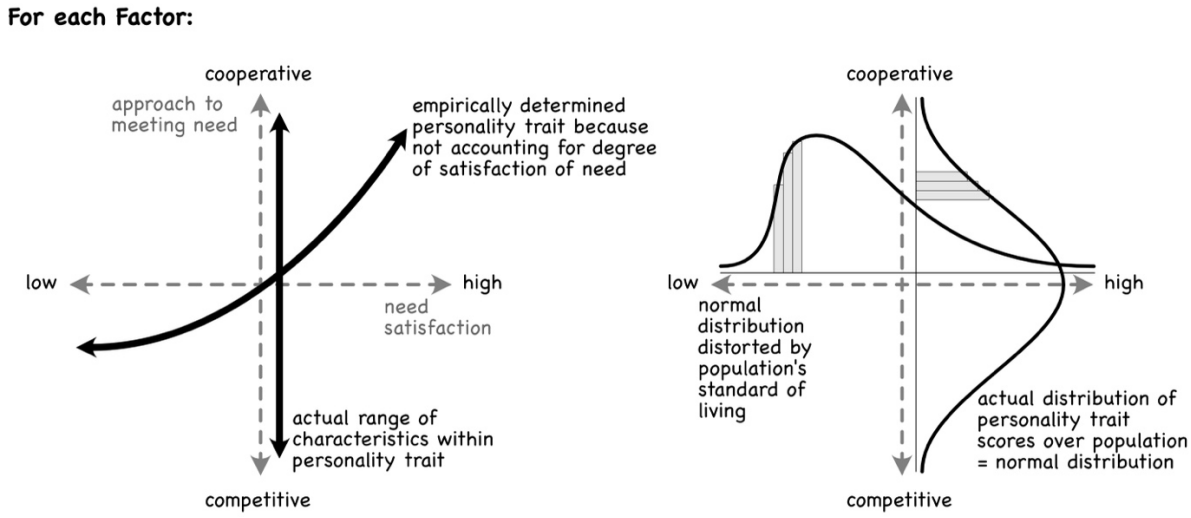
2	Safety/ Security	Agreeableness	In satisfying their Level 2 need, people become more self-assured – they see their near future as being more certain, there are no significant threats to the physical self or their income stream (whether that is money or food). This gives them the capacity to invest time and effort to improving further their fortune, seeing putting effort in as worthwhile and likely to reap rewards. Failure to meet this need results in fear, high levels of anxiety and chronic physical stress symptoms. If someone is inclined to meet this need competitively, then they will tend to operate more territorially, either seeking their own physical space or virtually in relation to activities. In a working context, this will be expressed as someone who is generally disagreeable, focussed on what they are doing themselves and all round not supportive of other's activities, if anything acting antagonistically towards others. They will be very focussed on personal achievements. In contrast, someone who is more cooperative will see the world in terms of group territoriality – again either physically or virtually. In a working context, they will be highly collaborative within their group, happy to contribute in any which way necessary towards the overall group's effort to get things done. They will gain great personal reward through the achievements of the whole group and thrive on camaraderie with their colleagues.
3	Healthcare/ Nurture	Emotional Stability	In satisfying their Level 3 need, people gain a sense of self-worth. By way of example, if a child is well-cared for by nurturing adults, they see those adults expending time and energy on them. From this, they perceive that they themselves must be valuable and this gives them a sense of self-value. So, they come to value their own health and well-being and gain the capacity to value things generally. Failure to meet this need results in someone who is very pre-occupied with worry. This is similar, but less extreme to, the consequence of not meeting Level 2 need. If someone is inclined to meet this need competitively, then they will tend to focus inwards onto themselves and those or that which is closest and most important to them (their children, their home, etc). Seeing themselves as the only way to resolve any health issues, they concentrate on their own concerns, because, if they themselves become ill, this will incapacitate them from looking after that which is dear to them. In contrast, someone who is more cooperative in relation to this need will see other people as a means to maintain their own health and well-being. They will have a strong sense of faith that others will come to their aid, as and when they need it. They will share their worries and concerns, following the spirit of the phrase 'a problem shared is a problem halved'. In turn, they will be far more likely to help others and be active members of the community, gaining a strong sense of belonging amongst those with whom they regularly reciprocate help and nurture.

4	Information	Conscientiousness	In satisfying their Level 4 need, people obtain accurate information about their surroundings, whether physical or social, and this gives them the ability to make decisions, from which their chosen courses of action give rise to reliably predictable beneficial outcomes. This means that they will come to see it being worthwhile being organised, planning and coming up with strategies. It also means that they can be more self-disciplined (say, buying or selling a share at the right moment to make a profit). Combined together this gives them self-respect and autonomy – both physical and social mobility. Failure to meet this need leads to frustration and an inability to plan for the future. This will force people to have to be spontaneous and flexible. If someone is inclined to meet this need competitively, then they will tend to be much more self-reliant on obtaining information themselves – want to see things with their own eyes. They are likely to be more suspicious of information received from others and probably keep information to themselves or, potentially, more likely to lie. They will be skeptical about their ability to influence the social world around them. In contrast, someone who prefers to obtain their information through cooperation will be far more likely to believe what others say and themselves recognise the benefit of being honest. They will readily share information truthfully. They will likely gain a sense of inclusion within society and a belief that they can influence people around them.
5	Expertise (gaining expertise)	Openness	In satisfying their Level 5 need, people master skills, probably more than just one, and gain expertise. In whatever form this takes, it is invariably achieved through neuroplasticity – the re-programming of neural pathways through repetitive behaviours. Such people will belief in the value of diligently practicing to achieve competence and success. Failure to meet this need leaves someone focussing on their lower-level more practical needs. If someone is inclined to meet this need competitively, then they will tend to focus wholly on their own abilities, potentially spending much time alone practicing to perfection. They are likely to become extremely skilled in a singular skill – say, becoming a virtuoso piano player, but having few other interests or skills. In contrast, someone who prefers to gain expertise cooperatively will likely look to a variety of mentors. They will thrive on encouragement from others and, when they are able, will be far more likely to mentor others and help them succeed. Through their interactions, they will be far more open-minded and likely gain either a variety of areas of expertise or be creative, incorporating new ideas into their existing skills (say, combining different music genres to invent a new type of music).

What becomes evident from the descriptions provided in Table 8 is that, for the lower-level needs, there is a high degree of correlation between Factors (low to high scoring traits) and whether someone operates competitively or cooperatively. However, progressing up the hierarchy, this correlation appears to diverge. At higher needs levels, the descriptions associated with acting cooperatively correlates reasonably well with high scoring personality types. But low scoring personality types appear to better correlate with poor satisfaction of needs than people being competitive.

Despite this divergence in relation to higher needs, the correlations, between what might be predicted and what is observed, are sufficiently close that it begs further investigation. As has been explored, there is a far more logical evolutionary explanation for inherited personalities to be linked to Forms of Interaction (competition/cooperation) than degrees of success in meeting needs. The suspicion, however, arises that empirical studies on personality types have been swayed by the state of the population and degree to which people in survey cohorts are meeting their respective needs (essentially their standard of living). If Maslow's Needs genuinely form a hierarchy, then in any cohort of people analysed for their personalities, one would expect reducing degrees of satisfaction of needs as you go up the levels from 1 to 5. At Level 5, a sizeable proportion of any study sample will likely not be meeting this need very well. Hence, assessed attitudes and observed behaviours for people tending to be competitive would deviate as depicted in Figure 1, and be mistakenly correlated with low satisfaction of need.

Figure 1 – Bias in the empirical determination of traits and trait distributions



Returning to Table 1, the two right-hand columns of this table seek to summarise the outcomes where individuals adequately satisfy their needs. In the case of the column titled 'Individual Consequence', these are the results of someone meeting their needs, regardless of whether they do so competitively or cooperatively. The column titled 'Social Consequence' includes the added result of someone meeting their need through cooperative interactions. The descriptions of the predicted personalities associated with each Ideal Type interaction, as given in Table 8, thereby provide justification for those tentatively proposed benefits from meeting each need first shown in Table 1.

The statistical variance of the five personality traits across populations broadly fits normal type distributions, such that most people sit in the middle of the various spectra and are reasonably adaptable, able to compete or cooperate as circumstances dictate. Where deviations have been measured from such normal distributions (Cain 2012, Costa and McCrae 1992, Terracciano et al 2006, Deyoung et al 2002), then this could have arisen because of variance in degrees of satisfaction of needs (see Figure 1).

Pulling these observations together, it suggests that measured personality at any moment in time will be influenced by a combination of factors:

- genetically inherited personality type;
- life experience and exposure to different degrees of competitive and cooperative interactions with respect to each need (clearly the nurturing environment during childhood will be critical for this);
- current perception of degree of satisfaction of need (both real and relative to peers); and
- degree of inherited flexibility (ability to vary between competitive and cooperative interactions).

On the last of the above bullets, if it is correct that personality traits are linked to the way people interact in relation to their respective needs, then it might be predicted that there would also be a genetic attribute associated with an individual's degree of flexibility (Mischel 2004): simply, can they readily switch between competitive or cooperative behaviour as circumstances require or are they more rigid in how they respond to situations?

3. Discussion

Returning to the question at the start of this paper: could there be any correlation between the five needs in Maslow's Hierarchy of Human Needs and the five personality traits in the Five Factor Model? The argument presented suggests that it is much more than a coincidence – that the existence of five needs, as a fundamental part of humans being living organisms, has given rise to five spectra of personality. The personality traits arose from competitive and cooperative interactions within an emergent social environment as agents sought to satisfy their basic needs to survive.

In reaching this position, it has been necessary to revise Maslow's original needs hypothesis. Needs are not states: someone is not permanently hungry. Rather, needs are part of processes, which everyone of us experiences everyday of our lives. As a by-product of this discussion, there is a suggestion that, just in the same way that we talk about different urges, the concept of happiness should also be seen as a combination of effects: (1) elation/exhileration, (2) relief/achievement, (3) contentment, (4) locus of control and (5) flow.

In seeing each need as part of a discrete process – urge, need, response – it becomes readily apparent how inherited personalities can adapt through lived experienced. Someone born slightly introverted, through regular Level 1 cooperative interactions with other people, constantly experiencing a bit of elation each time they purchase something, may incrementally be influenced to become more extraverted over their lifetime.

Whilst the Five Factor Model is supported by extensive empirical analysis, to-date there has been no theory underpinning why five factors and why these five factors. Connecting the Five Factor Model to Maslow's Hierarchy of Human Needs could provide such theoretical basis. If this were the case, then it would enable theoreticians and practitioners to further elicit the reasoning for these five factors – why they have emerged and what benefits they confer to people. This would enable theoreticians to further define the five factors, understanding better what each personality trait represents, why it exists in the way it does, and why high scoring and low scoring personalities manifest in the way they do. This could, in turn, be used to help people understand themselves better.

It has historically proven challenging to elicit the degree of validity of the Human Needs

hypothesis through survey work. This may have been hindered by the terminology used in Maslow's original construct. By looking at the whole picture – needs as processes – it may prove easier to examine whether the proposed set of needs can be supported by empirical analysis. If the correlations proposed between needs and traits were found to be valid, then it may also become possible to better assess how well people are satisfying their needs through their responses to personality tests.

To tease out whether this suggested connetion exists, then new survey work would need to be carried out. For instance, separate surveys could be carried out on same groups to see what correlation arose between responses on personality traits and how people approach meeting their needs.

In revising the needs hierarchy, it should now be possible to determine at last whether these are the definitive needs by looking at how people allocate their time. If resolution of these five needs, these motivators of action, is generally found to fill the whole of people's time, then arguably there are no other needs. Quantitative allocation of time to each need would also help assess how well people were indeed fulfilling their respective needs. Given some of the previous attempts to expand on Maslow's Needs, this might give rise to a 'healthy' debate over whether participation and attendance of religious ceremonies or other spiritual activity represented a form of meditation, supporting good mental health (Level 3 need), or should be construed to be something entirely separate. If, however, the connection between Factors and Needs is found to be valid, then the Five Factor Model indicates that there are indeed only five needs.

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