FIT, Working Memory and Self-Complexity

In various FIT Reports we have presented a large number of studies showing that FIT Science factors are positively related to the way people construe their lives, and how this helps them to behave in beneficial ways. This FIT Report looks at more basic building blocks of our cognitive architecture. It considers whether FIT variables are related to how people store and retrieve information in memory, and the level of complexity with which they interpret themselves and the world about them. Whilst we know that FIT and IQ are not linked (see *FIT Report – FIT and Examination Performance*) it may be that FIT predicts other more basic cognitive processes. This FIT Report specifically explores how FIT relates to the complexity of a persons' self-representation and their working memory capacity.

The way we engage with the world is highly individual. This is well established, and our FIT Report – *FIT and Life Engagement* shows that personal FIT variables also influence this. But does FIT affect how we view ourselves in very basic ways? One way it might do is to determine – to some extent – the complexity with which we see ourselves. We know, for example, that the cognitive FIT Constancies are related to our anxiety and depression levels. We also know that the more FIT a person is the less demanding they see their environment. Previous research suggests that a greater level of self-complexity can be protective. Having a more complex self-perception, or maintaining greater distinctions between various aspects of the self, means that a person is less susceptible to changes in any part of their outside world. This is because these changes affect a smaller proportion of the cognitive pillars that hold the person together. For a person with only a few of these 'cognitive pillars' a weakening in any one will have a more damaging effect than someone with a more complex self. Thus, the negative impact of stressors is buffered by the cognitive complexity of the person. This *FIT Report* examines if the differences in self-complexity that do exist between people are in any way related to how FIT they are. Given that being FIT is protective, one might expect those who score higher on FIT variables would also have more complex self-models. If a FIT person is more

cognitively complex, this may also mean they can make more fine-grained decisions too because their cognitive apparatus is more sophisticated.

The second cognitive aspect explored in this *FIT Report* is working memory. On a daily basis people continually use their working memory for all manner of decisions and interactions with the world. This is true for simple tasks such as remembering a friends telephone number, or for more complicated tasks such as remembering what to buy on the weekly shop, or the multifaceted angles of some complex argument. People pay little attention to the extent that they depend upon the reliability of their memory and it is only when their memory fails that people become conscious and appreciative of it's centrality to successful living. But what determines the capacity and reliability of a person's memory? Factors internal to the person such as their level of FITness may be related to working memory use and this report considers this.

FIT Science acknowledges that every person is unique and suggests that levels of Inner and Outer FITness determine the variability between people. A person's *Inner FITness*, or how they think, is a product of 5 *cognitive Constancies (Awareness, Balance, Conscience, Fearlessness & Self-Responsibility)* and – in the FIT person – these are the cognitive templates that determine an individual's behavioural flexibility or Outer FITness. A FIT person is able to behave appropriately in any situation and thus has the ability to engage in a range of life activities with greater success and less apprehension. Through these interactions they are able to develop their self-identify. They may also be more able to accurately reflect and integrate their experiences and thoughts into their self-perception and thus, develop complex self-representations.

In a similar way, FITness could benefit the cognitive abilities of a person. The FIT person — who functions efficiently — does not deplete their resources coping with life and thus, has more cognitive resources available for on-line tasks. Working memory is just one example of a cognitive ability that could benefit from FIT.

This FIT report considers whether FITness is linked to a person's self-complexity and also their cognitive ability in the form of working memory capacity. If FIT relates to either, this would help identify a pathway through which a person might develop their cognitive abilities – FIT training and coaching.

This FIT Report is based on two pilot empirical studies that explore such issues for the first time. Study 1 investigates the relationship between FIT and self-complexity in a sample of 80 participants. Study 2 explores the relationship between FIT and working memory capacity. It includes participants from a large age range to minimise the likelihood that any relationship between FIT and working memory capacity might be confounded by age.

Participants

Study 1: 80 participants, aged between 18 and 80 years (mean age = 38 years), took part in this study.
Study 2: There were 134 participants (48 males, 86 females), aged between 18-79 years, although with a bias towards young adults (mean age = 22.50).

Measures

Study 1: Participants completed *The FIT Profiler* and a measure of self-complexity known as *Scott's H* which is a sophisticated form of card-sorting task.

The *Scott's H task* assessed the number and distinctiveness of attributes an individual uses to think about him or herself. Participants sorted a pack of 33 randomly ordered cards, each containing the name of one trait (e.g. outgoing, rebellious) into as many or few different piles as they wished. The traits were chosen to represent a wide range of dimensions and were both positive and negative. Traits could be sorted on any meaningful basis – this was entirely up to the person. Blank cards were available and allowed the same trait to be placed in multiple piles. The number and distinctiveness of

piles was calculated and used as the metric for self-complexity, with a larger score indicating greater self-complexity.

Study 2: Participants completed *The FIT Profiler* and a working memory task known as the *word span test* (Daneman & Carpenter, 1985). This memory test is an 'industry standard'.

In the *word span test* participants were verbally presented with a series of short sentences contained in incrementally more difficult blocks (e.g. 2, 3 or 4 sentences). On hearing each sentence participants stated whether the sentence was true or false. After hearing a block of sentences, participants were cued to recall the last word of each sentence in the block, in the order they were presented. The number of sentences contained within each block increased as participants displayed correct recall. Working memory span was derived from the total number of words correctly recalled in the correct serial position (range = 2-8).

Outcomes

Study 1:
The mean self-complexity score across all participants was 4.90. This indicates that on average participants sorted the cards into 5 different piles and therefore perceived they had 5 distinct aspects. There were individual differences in self-complexity and the maximum number of piles generated was 15, and the minimum 2.

The relationship between FITness and self-complexity was explored using Pearson's correlation coefficient (a measure of the strength of an association). If FITter people have more complex self-perceptions, as predicted, then a positive correlation should be observed. Table 1 displays the statistically significant results.

Two of the FIT variables, *Overall FITness* and *Behavioural Flexibility*, were significantly related to self-complexity. The higher the FIT score the greater the self-complexity. Thus,

FITter people have more complex cognitive representation of themselves. It should be noted that the size of the correlations are not particularly large, but one might not expect individual differences of this kind to be very strongly related. It is also interesting to note that it is the Outer FITness – or behavioural variables – that are primarily responsible for the associations. None of the Inner FIT variables showed any association with the complexity scores.

Table 1: Relationship between FIT variables and Scott's H scores.

FIT Variable	Correlation (r)	Probability (p value)	Variance accounted for
Overall FITness	0.24	0.03	5.7%
Behavioural Flexibility	0.21	0.06	4.4%

To explore the extent to which FIT influences self-complexity, participants were categorised according to their FIT scores and a comparison of self-complexity was made between participant groups. Participants with FIT scores equal to or below the mean on Overall FIT and Behavioural Flexibility were categorised into the 'low FIT' group and participants with scores above the relevant mean scores were categorised into the 'high FIT' group. The results are displayed in Table 2 below.

As expected, the Scott's H scores were higher for participants in the high FIT group and the differences were large enough to reach significance ($p < 0.05$). This confirms that the group differences observed for self-complexity were attributable to FIT and did not occur by chance alone.

Table 2: Scott's H scores for high and low FIT groups.

FIT Variable	FIT group	Number of participants	Mean self-complexity score
Overall FITness	Low	44	4.3
	High	36	5.6
Behavioural Flexibility	Low	43	4.3
	High	37	5.7

Study 2:

The results of Study 2 confirmed that FIT variables were related to working memory span. FITter participants had larger working memory capacities. Table 3 shows the statistically significant relationships. Overall, *FIT Integrity* (which is a score based on all 5 Constancies) showed significant relationships with working memory span scores. When considering which of the specific 5 Constancies might be most important, the analysis showed these were both *Conscience*, and, to a marginal level (because a p value of smaller than 0.05 is the acceptable minimum) *Fearlessness*.

Table 3: Relationship between FIT variables and working memory span scores.

FIT Variable	Correlation (r)	Probability (p value)	Variance accounted for
Integrity	0.19	0.03	3.6%
Conscience	0.20	0.02	4%
Fearlessness	0.17	0.06	2.8%

Further analysis investigated the differences in working memory span scores between participants who were classified as either high or low FIT. A mean split on the relevant FIT variables determined classification into a FIT group. The data are displayed in Table 4. Again, participants in the high FIT groups had higher working memory span scores and the differences were significant ($p < 0.05$) and therefore attributable to FIT and not chance.

Table 4: Working memory span scores for high and low FIT groups.

FIT Variable	FIT group	Number of participants	Mean working memory span score
Integrity	Low	68	3.21
	High	65	3.58
Conscience	Low	66	3.29
	High	67	3.49
Fearlessness	Low	69	3.17
	High	64	3.63

Conclusions

FIT variables were shown to positively relate to two quite different core cognitive measures of a person. FITter individuals have more complex self-representations and superior working memory spans than less FIT people. One interesting aspect of a comparison between the two studies is that the first shows a relationship between the cognitive task and Outer FITness (but not Inner FIT variables) and the second shows a relationship between the cognitive task and Inner FITness (but not Outer FIT variables). Why there might be this disjunction is of interest and needs to be examined in further research. Perhaps being more behaviourally complex (i.e. having higher Outer FIT scores) leads to a more complex self through the experiences gained by the behaviours. It may also be that having higher levels of Inner FITness leaves more cognitive resources available for everyday use – an unfit person may need to use more of their cognitive resources to make sense of the world because they are less integrated.

The fact that core cognitive processes appear to be related to FIT Science factors has many positive ramifications. Perhaps the most exciting possibility is that training and coaching people in FIT Science could improve these core processes.