Hunter-gatherer theory and falsification resilience in evolutionary psychology theories.

Theories within psychology tend to follow a Lakatonian structure, sometimes harbouring a strong resilience towards falsification. Theories that potentially could be discarded stay in the field because no strong challenger exists. Popper’s philosophy suggests that falsified theories should be rejected, but in practice psychology is more robust and theories are typically subject to batteries of evidence against it before falsification occurs. This way of thinking I fear is more prevalent in evolutionary psychology than other psychological disciplines because the discipline is newer, smaller, and more importantly because it investigates more elusive aspects of human behaviour. I will use the hunter-gatherer theory as an example of how detachment from flawed theories is difficult within evolutionary psychology.

Evolutionary psychology makes assumptions about the past to contrast with the present, and it is therefore not surprising that the discipline has been criticised for not being empirical enough (for an overview see Confer et al., 2010). However, this criticism is largely unfounded as long as the evolutionary hypotheses avoid certain pitfalls. The biggest such pitfall is a tendency within evolutionary psychology to create *ad-hoc* hypotheses, which rely on already existing data. This makes a hypothesis descriptive rather than predictive, which can lead it to be labelled a “just-so story”. For example, men have been shown to display better spatial abilities than women (Voyer, Voyer, & Bryden, 1995). If I were to say this is because men were hunters in early human settlements, then this “story” makes logical sense (Silverman & Eals, 1992). However, if someone else were to say it is because men would travel larger distances than women in search for mates (Gray & Buffery, 1971), then this also makes sense. I might even suggest it is because men were involved in male-to-male warfare (Sherry &
Hampson, 1997). Any hypothesis that only acts to explain the existing data without generating new hypotheses is potentially as reasonable as the next. It is therefore very important for evolutionary theories to be, at least in part, *a priori* and be able to generate new hypotheses.

Evolutionary theories are sometimes extraordinarily resilient against falsification because they at least offer an *explanation* to a behaviour from an evolutionary perspective, compared to no explanation. This detachment from rejection in the scientific community means that psychologists are potentially wasting time researching around a theory that is largely contradictive. Perhaps it would be better to distance ourselves from theories that are ripe with debates and contradicting evidence, and instead focus on generating new hypotheses that may explain a behaviour, as opposed to just elaborating on the already existing ones.

I will illustrate falsification resilience and pitfalls in evolutionary psychology with the hunter-gatherer theory (Silverman & Eals, 1992), on which my BSc dissertation was based. The theory argues that women should have improved object location memory (OLM) because they were gatherers who had to remember food locations for subsequent seasons. In contrast, men were hunters and have therefore developed improved spatial abilities, such as mental rotation. Being successful at these tasks would increase the chance of survival and in turn reproduction.

The first problem with this theory is that it was *ad-hoc*; its predictions about improved spatial abilities in men were largely based on a meta-study by Linn and Peterson (1985). The researchers also created a task to assess OLM, but failed to realise that previous research on OLM already existed and had suggested a female advantage (Crook et al., 1990). However, subsequent research on OLM has almost exclusively used variations of the OLM task created by Silverman and Eals (1992). In their task participants study an array of objects, followed by a second array where some of the items have exchanged location. Women were found to be better at identifying which items had been moved. It was soon suggested that the female advantage observed in OLM could be mediated by improved verbal memory in women, something Chipman and Kimura (1998) confirmed. However, in their original article Silverman and Eals (1992) suggest that even if verbal memory mediate OLM, then most
likely improved verbal memory also stemmed from a division of labour. To me this gives the impression that the theory is shielding itself from potential future criticism.

In my research I found that evidence for the hunter-gatherer theory was often conflicting. For example, if men were hunters they should be able to navigate better than women. Most research has found a male advantage in navigation, provided landmarks are not involved (Moffat et al., 1998). However, in real-world situations men have been found to be poor at navigating if the sun is not visible, and typically ending up walking in circles (Souman et al., 2009). The female advantage observed in OLM is also sensitive to experimental conditions: no sex difference is observed if tested a week later rather than immediately (Honda & Nihei, 2009), if abstract objects are used (Rahman et al., 2011), or if objects in the arrays move to empty locations rather than exchange locations with other objects (James & Kimura, 1997). It has also been found that the male advantage in mental rotation is mediated by motivation (Estes & Felker, 2012). While it is possible that sexual selection has acted on motivation rather than mental rotation, Stoet (2011) suggest that this is unlikely because men were not necessarily hunters because they were better at it: they were hunters because this was more convenient (child bearing may restrict hunting in women).

My own research on hunter-gatherer theory focused on foraging-related stimuli and how this would affect performance in OLM. If men were hunters they might have an increased sensitivity to animal stimuli, while women have a similar sensitivity to fruit stimuli. Previous research on this subject was scarce, but a study by Hulbert & Ling (2007) suggested that women were more attracted to colours signalling ripeness. We conducted an OLM task where stimuli were manipulated to be pictures of animals, fruit, or neutral objects (i.e. non-foraging related). As expected, females were better than men in the neutral condition, but this advantage disappeared with fruit and animal stimuli. In a follow-up reaction time experiment, no sex difference was found in perceptual search speed between fruit and animal stimuli. The results suggested that fruit and animal stimuli have an equal impact on OLM and that this stemmed from a much longer evolutionary history than suggested by hunter-gatherer theory. That the OLM asymmetry has a longer evolutionary history is also suggested by animal studies on rats, which also found sex differences in OLM (Saucier et al., 2008). An interesting animal study would be to see if lions, where it is primarily the females which hunt, also display an OLM asymmetry.
Considering the amount of conflicting evidence for the hunter-gatherer theory I was always surprised that it remained viable. Of course, this is partially because some evidence exists in favour for the theory which is less confounded: men are better with throwing accuracy than women, even if controlling for physical build and experience (Westergard et al., 2000), and men perform tasks better in far space while women perform better in near space (Saucier et al., 2007). Despite this, the amount of conflicting evidence available would suggest that the theory should be discarded or at least revised, but this has not occurred. This sort of approach is highly Lakatonian, something which is very common within psychology: theories are generally not rejected immediately following falsification. Instead, the outer layers of a theory need to be reliably falsified and eventually replaced by different hypotheses before rejection can occur. In evolutionary psychology, we investigate why we behave as we do, and therefore this falsification resilience may become more of a problem; evolutionary psychologists may be more satisfied with an incorrect explanation as opposed to no explanation.

It is important for evolutionary theories to function on the function behind a behaviour: if the function for improved spatial ability in men is to hunt better, there must have been selection pressure to develop spatial abilities as this increased the likelihood of getting food. Now we have to think of what consequences (or by-products) this evolutionary path would have, assuming it is true (note that we are now making the assumption that our male ancestors did not have improved spatial abilities, but developed them, making investigations even trickier). In other words, when a behaviour evolves we may expect other behaviours to accompany it. This is something the hunter-gatherer theory does well, and it is one of the main reasons why it remains viable: e.g. we may assume that if men were hunters then they should be better with long distance navigation, movement prediction, and be less distracted by irrelevant stimuli. Despite these predictions, one could argue that the theory is only partially viable because some of the predictions are not supported. When theories are flawed in this way, I believe it best to abandon the theory (or at least revise it) and look for a better a priori hypothesis, rather than spending time looking for more evidence that will only potentially support the original theory.

Evolutionary psychologists should also avoid making too broad hypotheses. The hunter-gatherer theory is too broad because it works on the assumption that any dissociations
observed originate from the same evolutionary scenario. In other words, they assume that a labour division between sexes has created two different evolutionary paths, but who is to say these two paths are mutually exclusive? The theory therefore becomes very broad when in fact we might be dealing with multiple reasons for the observed behaviours. A better approach would be to say that women have an *improved* performance in absolute object location memory because they were gatherers and men were not (New et al., 2007)! Such a prediction only makes inferences about gathering-related data; it makes no difference whether men were hunters or not.

Evolutionary psychology is as viable a discipline as the next, provided that steps are taken to improve falsifiability. Whenever possible the hypotheses should be *a priori*, domain-specific, and focus on a function that generates testable auxiliary hypotheses. Finally, psychologists should learn to detach themselves from theories that show a large amount of contradicting evidence. Conflicting evidence may suggest that the proposed theory is not the most suitable one to explain the phenomenon in question. I therefore believe that such theories should be discarded, even if no viable opposing theory exists. One could argue that doing so would give an impression of futility where previous research was a waste of time. However, I believe it instead would give rise to increased inspiration and creativity, which is one step closer to finding better theories. There are great theories out there; we just need to discover them.


