Behavioural Estimating

Can psychology teach us to be better estimators?

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Society for Cost Analysts and Forecasting (SCAF) Conference

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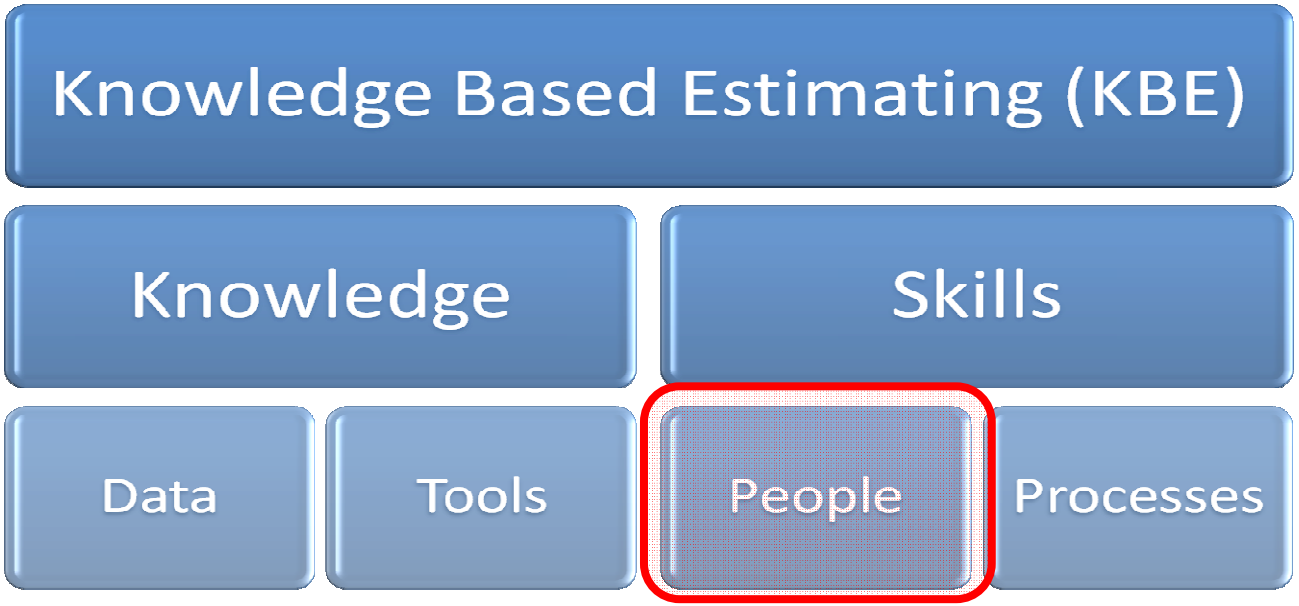
QinetiQ Cost Estimating Philosophy



Knowledge Based Estimating (KBE) is the philosophy that underpins the QinetiQ approach to Cost Forecasting. The building blocks of all good cost forecasts combine:

- **Data** – understanding the current project in the context of past projects
- **Tools** – the analytical and forecasting capabilities
- **People** – proactive staff certified and trained, looking to add value
- **Process** – structured approach to the task

Background – what has prompted this work?

Economics – traditionally based upon ***Homo economicus***

- a rational and narrowly self-interested individual who has the ability to make judgments toward his subjectively defined end.
- maximises utility as a consumer and economic profit as a producer

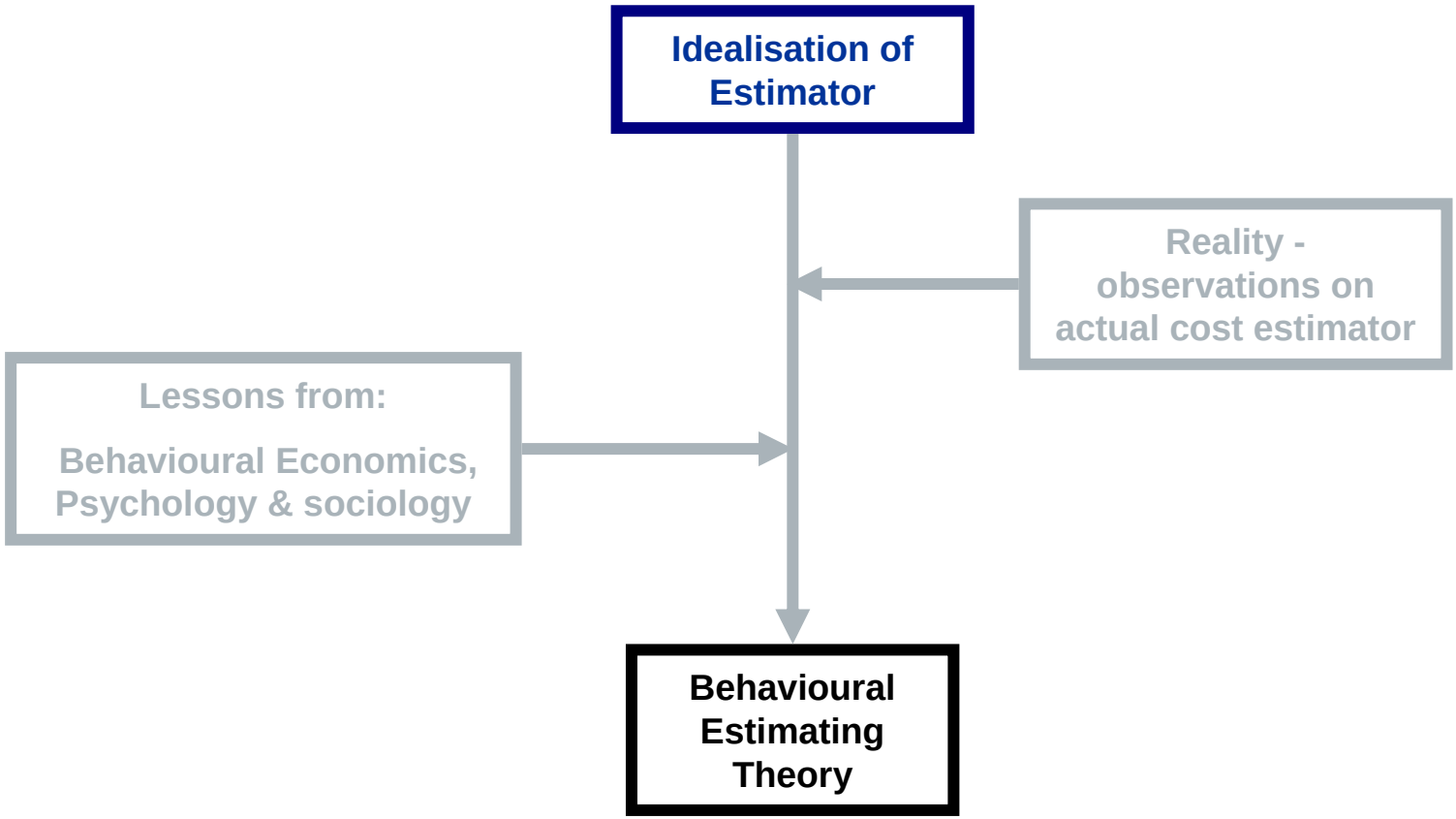
Failings:

- individuals have bounded rationality
- individuals make emotional decisions
- Individuals act altruistically

Behavioural economics introduces the human element to economics and explains these variances

Can we use similar principles (combining psychology with our estimating observations) to explain why we sometimes get our estimates wrong?

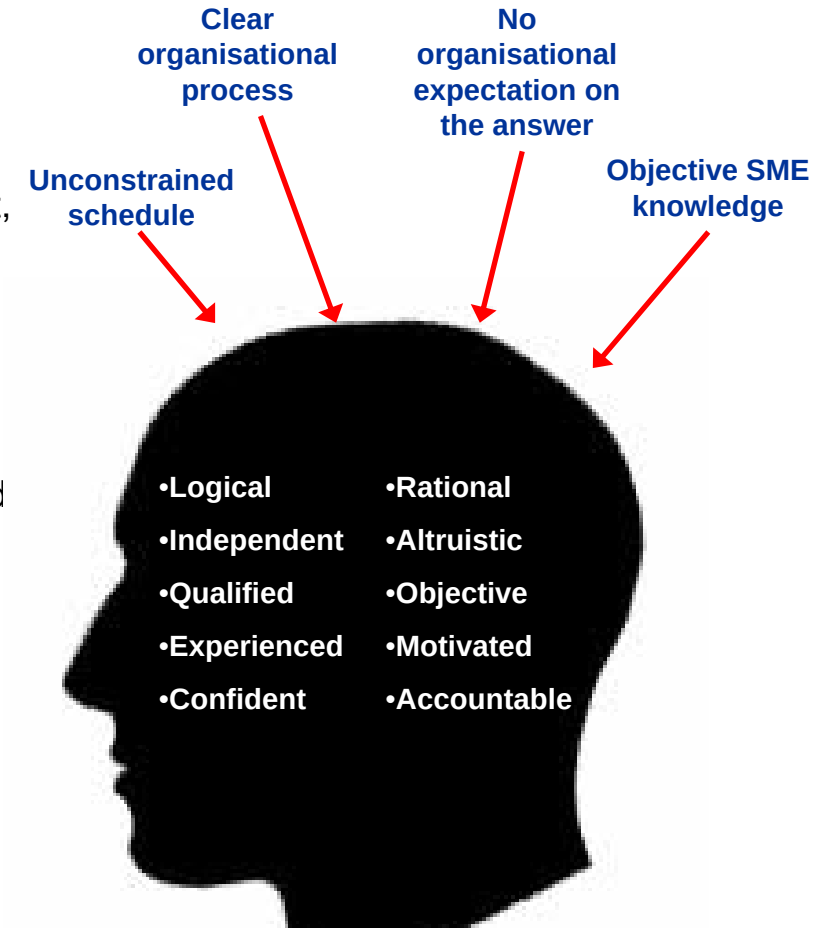
Background - How



KBE, People & Their Behaviour

Within estimating People are needed to:

- Understand costing requirements – decision support
- Communicate effectively with individuals from government, industry and armed forces
- Understand technical & programmatic characteristics of new concepts
- Draw analogies with historic systems
- Objectively interpret historical data, define cost drivers and identify logical CERs
- Apply CERs & develop rational estimates
- Scrutinise estimates for validity
- Confidently present (sell) results to peers & decision makers
- Defend results under external scrutiny

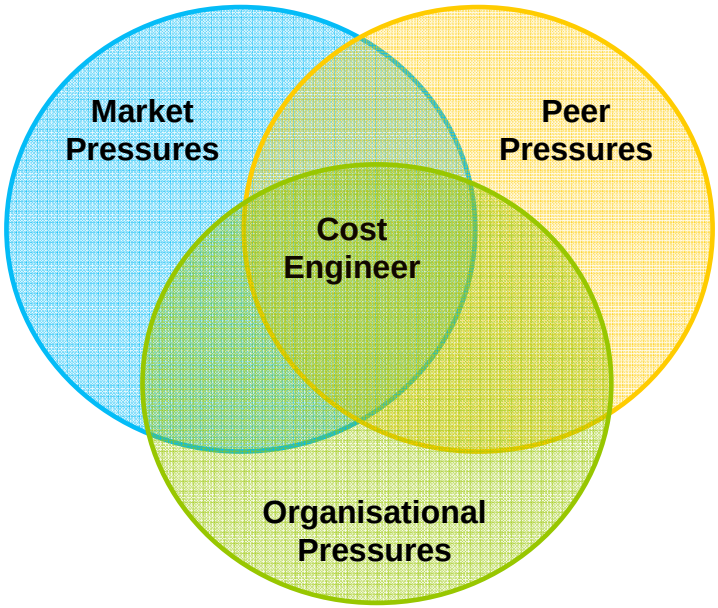


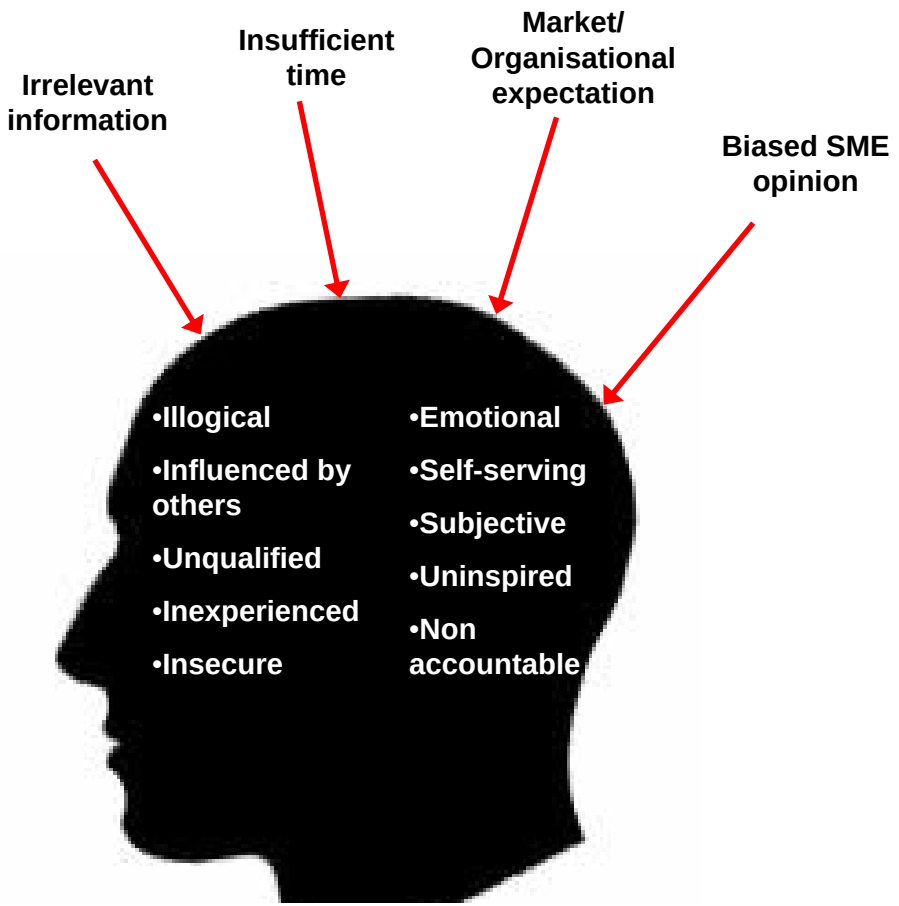
The Ideal Cost Estimator

("Homo Estimatus")

So why are our estimates often wrong?

The Real Cost Estimator

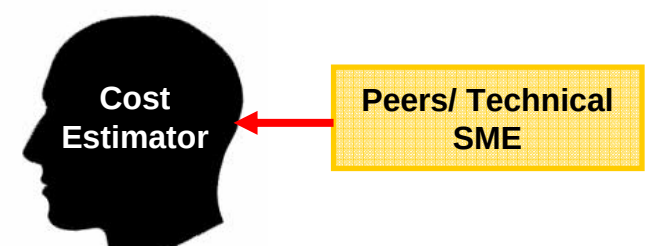




The Real Cost Estimator

Observation 1 - Technical Bias

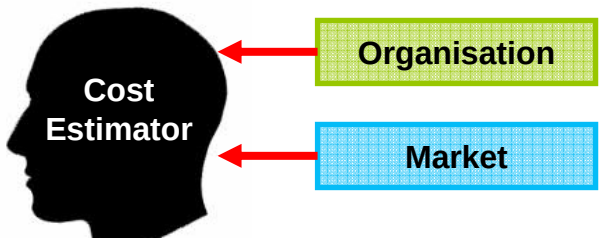
SMEs (often engineers) are biased by nature and this often leads to biased cost estimates.



- ***Selective Recall*** - Even if an SME has interpreted evidence in a neutral manner, they may still remember it selectively to reinforce their expectations. Individuals act in their own self interest to satisfy their own goals or to re-enforce the opinions they hold of themselves.
- ***Illusory correlation*** - Humans have the natural tendency to seek relationships between variables but this can lead to seeing non-existent correlations.
- ***Optimism bias -*** It has been demonstrated that under normal conditions the human tendency is towards optimism where they believe they are less at risk of experiencing a negative event compared to others.
- ***Pessimism bias*** - Certain individuals, especially those within depressed states of mind have been demonstrated to exaggerate the likelihood of negative things occurring.
- ***Recency & primacy effect*** - When recalling a list of items in any order (free recall), people tend to begin recall with the end of the list, recalling those items best. Among earlier list items, the first few items are recalled more frequently than the middle items.

Observation 2: Social Influence

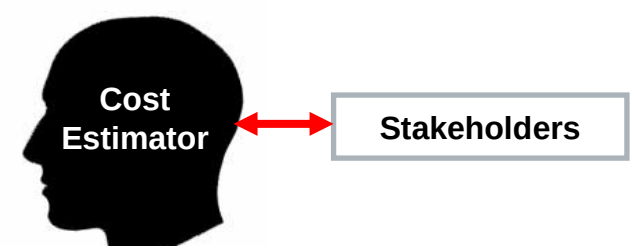
Estimation is conducted within the context of an organisational (and Market) setting, and the expectations of that organisation (and Market) will impact on the quality of the estimate generated.



- ***Group strength -*** The stronger a group and the more important it is to an individual—the more likely that individual is to comply with social influence.
- ***Group proximity -*** The proximity of the group makes an individual more likely to conform and comply with the group's pressures.
- ***Relationship to group*** - Pressures are strongest when the group is composed of people the individual cares about (i.e., friends, family) and/or authority figures.
- ***Group Size -*** Compliance increases as the number of people in the group increases;
- ***Group size optimisation*** - once the group reaches 4 or 5 people, compliance is less likely to occur. After this point, each additional person has less of an influencing effect. However, adding more members to a small group (i.e., 3 to 4 people) has a greater effect than adding more members to a larger group

Observation 3: Information Exchange

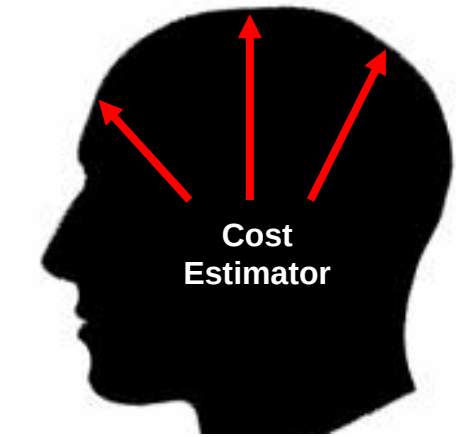
Estimation is facilitated by a complex set of social information exchanges, all of which impact the quality of the generated estimate.



- ***Reciprocity effect*** - When approaching individuals for information they are more likely to provide it if they believe that they will get something in return.
- ***Anchoring effect*** - Individuals have been shown to rely too heavily on the first piece of information offered when making decisions. A cost engineers bias can result in questions being asked in a leading or loaded manner which will result in information that is biased.
- ***Framing effect*** - People react differently to a particular choice depending on whether it is presented as a loss or as a gain.
- ***Halo effect*** - Individuals place greater confidence in an individuals evidence if they can find attributes of the individual that they like, regardless of whether that evidence is correct.

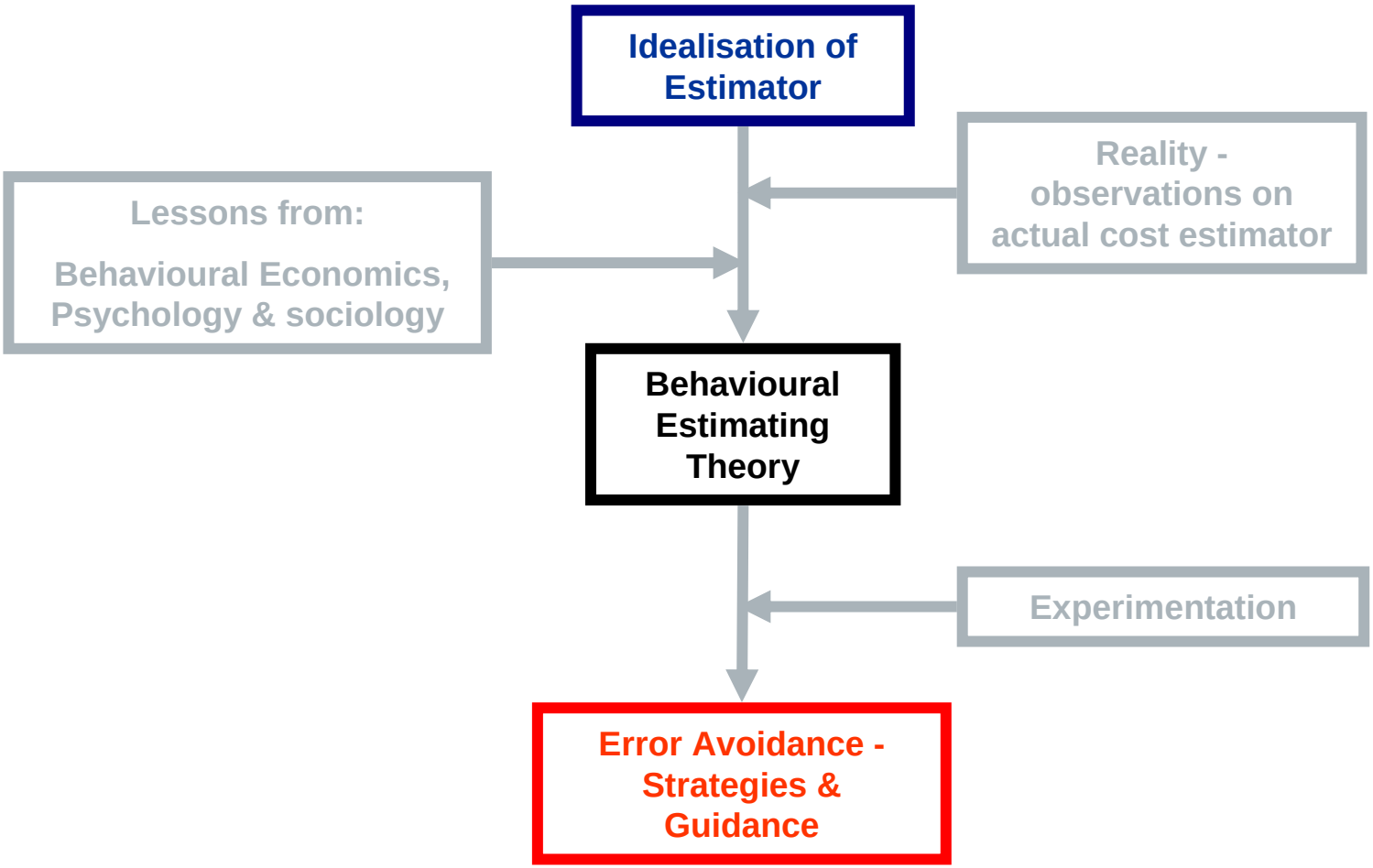
Observation 4: Estimator Experience & Qualification

The generation of justified and credible estimates needs to be produced by suitably qualified and experienced cost estimators.



- ***Over confidence effect -*** It has been consistently demonstrated that individuals subjective confidence in their judgments is reliably greater than their objective accuracy, especially when confidence is relatively high. The impact of experience and qualification upon this within cost estimation would be worthy of further exploration.
- ***Classical or operant conditioning*** - The experience of a cost estimator may act to diminish their objectiveness which may be disadvantageous/ advantageous depending upon the circumstance i.e. always using certain ***rules of thumb*** (adding on 20% to a particular estimate).
- ***Attentional biases*** - Individuals who lack experience may focus on limited information within their immediate environment *(localised dominant stimuli)* but fail to understand the wider context of their tasking.
- ***Small probabilities*** –it has been shown that people tend to under-react to low-probability events resulting in them being willing to make super-risky choices. An experienced estimator will instinctively know not to ignore low probability events
- ***Prospect theory*** - states that people make decisions based on the potential value of losses and gains rather than the final outcome

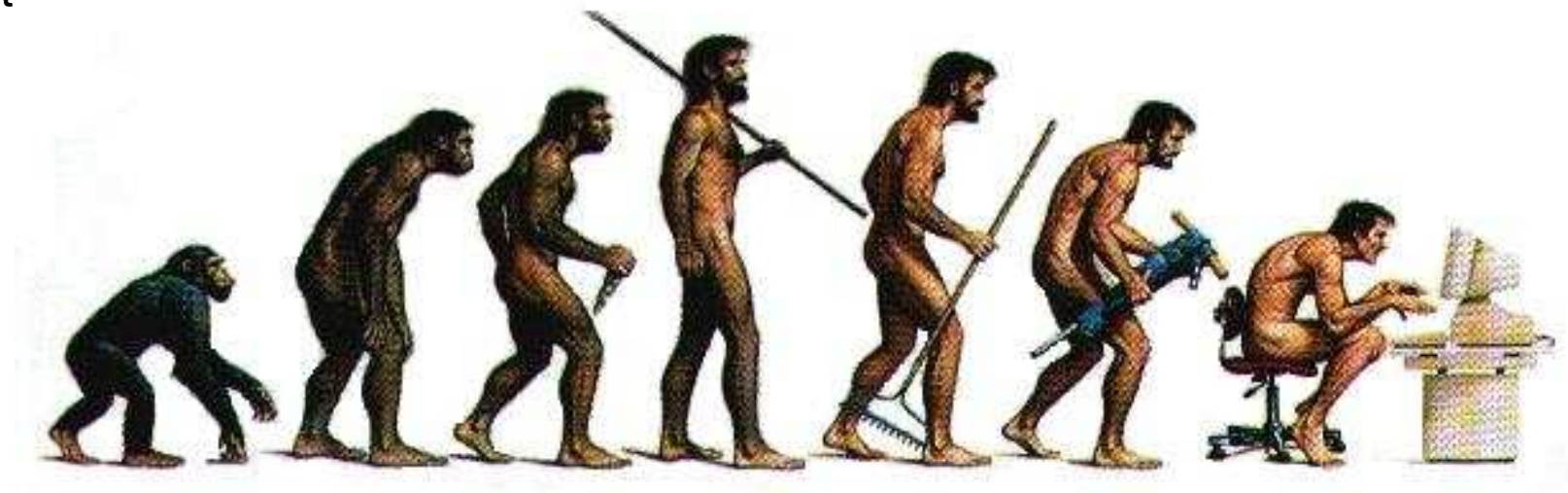
What next?



Summary

Can psychology teach us to be better estimators? - YES -

- There is a human element to cost estimating
- Peoples behaviours can introduce errors to cost estimates
- Understanding which behaviours introduce errors means that measures can be put



Any Questions?

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