

PCT: Preliminary Proposal for an Empirical Review

Warren Mansell, School of Psychological Sciences, University of Manchester, UK

As far as I am aware, there is no systematic review paper that describes and evaluates the evidence relating to PCT. This paper describes the plans for an empirical review article to submit to either *Psychological Bulletin* or *Behavior & Brain Sciences*. I am hoping for comments and feedback, and in particular suggestions of empirical articles that I may have missed to include in the review. The article will need to be extensive yet focused and scholarly yet accessible so I hope to get significant help from colleagues with the style and format.

The provisional title for the article is: "Perceptual Control Theory as an Integrative Framework for Psychology: Empirical Review, Applications and Future Research"

As planned, the article will be divided into the following major sections:

- 1. Introduction**
- 2. The Phenomenon of Control**
- 3. Overview of Perceptual Control Theory and its Methodologies** (Powers, Vancouver, Marken)
- 4. Principle 1: Control via Negative Feedback**
- 5. Principle 2: Hierarchical Organisation**
- 6. Principle 3: Conflict**
- 7. Principle 4: Reorganisation**
- 8. Combined Principles**
- 9. Further Components of PCT Including Modes and Memory**
- 10. Summary of Empirical Review**
- 11. Applications**
- 12. Future Directions**
- 13. Conclusion**

The plan is for each of the Sections 4 to 8 to have the following subheadings:

Overview

- History**
- Operationalised definition**
- Commonalities shared with other theories**
- Distinctive features**

Empirical Evaluation

- Engineering applications**
- Explanation for observations**
- Empirical Tests of PCT**
- Comparative studies**
- Consistency with research in neuroscience**
- Further Issues**

Table 1 illustrates the studies that I plan to include in the review under each of these sections. I also plan to produce table that describes 'PCT-like' theories and their properties. Often a criticism levelled at PCT is that it is merely similar to an existing theory. This is often claimed because that theory, for example describes goal hierarchies, or negative feedback. The aim of this table will be to show that while PCT shares *some* of its characteristics with *some* other theories, it is unique in how it operationalises its principles, and in the components it involves and how they relate to one another.

<i>Principle of PCT</i>	<i>Explanation for Observations</i>	<i>Test of Principle</i>	<i>Comparative studies</i>	<i>Consistency with findings in biology & neuroscience</i>
Control via negative feedback	Marken (2002) Powers (1960; 1973a; 1973b; 1992; 1998)	Pellis et al., (2009) Powers (2008) Bourbon (1996) McPhail et al. (1992) Robertson et al. (1999)	Marken (1980; 2001) Vancouver & Scherbaum (2008) Powers (1978; 1979b)	Homeostasis Self-regulatory nature of neurones (e.g. Feldman) 'Control' in neuropsychology under various guises – 'adaptive', 'effortful', 'cognitive', 'executive'
Hierarchical organisation	Powers (1960; 1979a)	Marken (1987) Kennaway (1999) Powers (2008)	?	Historic discussion of hierarchies, although typically behavioural; reviews include Botvinick (2007);
Conflict	Kelly, Mansell & Wood (submitted) Carey (2008a)	Bourbon (1989) McPhail et al. (1992) Powers (2008)	?	Widespread investigation of conflict monitoring and its neural basis, e.g. Botvinick et al. (2001); yet still concerned largely with 'response' conflict
Reorganisation	Carey (2010) MacNamee & Mansell (in prep)	Marken & Powers (1989) Powers (2008)	?	Most describe learning of 'responses'; notable exceptions include: Simonton (2010); Huether (1998; 2000)
Combined principles	Bird et al. (2009) Carey (2006; 2008b) Carver & Scheier (1982) Cziko (1997; 2000) Higginson et al. (2010) Mansell (2005) Powers (1973; 1998) Runkel (2003) Van der Rijt-Plooij & Plooij (1993; 1997) Vancouver (2005)	Powers (2008)	?	Conflict, control, hierarchy & reinforcement learning (Botvinick); but still adheres to stimulus-response mappings

Full references are not included at present. Note that most of the key papers from Powers described here are reproduced in Living Control Systems I, II & III.