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Disentangling motivational and experiential aspects of "utility" – A neuroeconomics perspective

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ABSTRACT

Although decision makers are often reported to have difficulties in making comparisons between multidimensional decision outcomes, economic theory assumes a unidimensional utility measure. This paper reviews evidence from behavioral and brain sciences to assess whether, and for what reasons, this assumption may be warranted. It is claimed that the decision makers' difficulties can be explained once the motivational aspects of utility ("wanting") are disentangled from the experiential ones ("liking") and the features of the different brain processes involved are recognized.

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> "How do we sum up, on the basis of some objective measures of intensities, the respective desires for an ice-cream, freedom from a headache, writing the most beautiful sonnet ever written, going to bed with one's favorite film star, and being morally impeccable?" (Sen, 1981, 200)

1. Introduction

At the heart of microeconomic theorizing lies the concept of individual preferences. In its present, axiomatically founded form, it is the outcome of a century-long transformation of utility theory and its core notions (Bruni & Sugden, 2007; Lewin, 1996; Mirowski, 1989). Initially, in the writings of classical utilitarians like Bentham and Mill, the notion was substantiated in terms of physiological and psychological conjectures about how utility arises from the enjoyment of a variety of pleasures and the avoidance of various pains and, hence, in multiple dimensions. Today the standard interpretation of "utility" has mutated into the abstract concept of a unidimensional index number stripped off of all sensory connotations. It serves as a

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placeholder for "...that which represents a person's preferences" (Broome, 1991, italics omitted). The "purging out" of the physiological and psychological hedonistic aspect of utility (as Samuelson, 1947, 90-1 put it) helped to increase the "mathematical fitness" (Warke, 1998) of the theory, but it came at a cost.

Where classical utilitarianism gave the enjoyment/avoidance of the various sorts of pleasures/pains as the reason that motivates corresponding actions, in modern preference theory there is now only an abstract idea of preference satisfaction. More substantial hypotheses about the motivations that are causing actions are lacking. Under such conditions it is difficult, if not impossible, to resolve two problems which modern preference theory faces.

The first problem is to assess whether "preference satisfaction" is meant to be the motivating force of an action or the experienced outcome of an action. Or can it be both at the same time? The second problem relates to the question of whether a unidimensional index number is indeed an appropriate measure for utility. Corresponding to the different underlying motivations there are obviously different sources from which utility can arise. One might be inclined therefore to follow the classical utilitarians in their assumption of a multidimensional measure. Consider the example of a wristwatch. It may be a source of utility as a chronograph, as an esthetic pleasure, as a status symbol, as a collector's item, etc. Can utility derived from the different sources indeed be lumped together? If so, how is this done? Suppose it cannot be done and assume that a fountain pen is a source of similar multiple utilities. Would a decision maker then have to determine the substitution rates between wristwatches and fountain pens in all the different dimensions of utility independently?

Regarding the first problem, standard preference calculus obviously conflates the two interpretations of a desire to satisfy preferences by a particular action (the motivating aspect) and the experience of preference satisfaction connected with that action (the welfare or well-being aspect). In recent works in behavioral economics (Berridge, 1999; Berridge & Robinson, 2003; Markman & Brendl, 2005; Winkielman & Berridge, 2003) the two qualities of utility as motivator and experienced reward are identified with the concepts of "wanting" and "liking" respectively. They do not necessarily accord with each other. An agent wanting a particular choice may eventually find herself in a situation of not liking that choice and vice versa. The challenge that a potential discrepancy implies for rational decision-making is obvious: should the satisfaction of a preference still be considered rational even if it does not increase liking (Sen, 1973)?

In this paper we will argue that both the dimensionality or index number problem and the potential discrepancy between "wanting" and "liking" are closely connected to each other. In order to come to grips with both it is necessary to put some flesh on the bare bones of preference theory. We suggest to revive the interest of classical utilitarianism in physiological and psychological hypotheses and to elaborate them in the light of new findings from the behavioral and brain sciences.

The paper is structured as follows. In Section 2 we will first expand on the dual problem of uni- versus multidimensional utility on the one hand and that of "liking" versus "wanting" on the other. Section 3 then discusses relevant evidence from the behavioral and brain sciences. It helps to better assess whether or not utility is properly represented as a unidimensional magnitude. The discussion will be linked here to an analysis of how the brain processes reward. While there may be multiple sources of reward, evidence supports the view that, in experiencing them (i.e. in scaling the "liking"), the brain spontaneously aggregates them into a unidimensional neural substrate, a common neural "currency". However, as will be explained in Section 4, this does not mean that the aggregate value of reward in terms of the neural currency that can be obtained from multiple sources is always anticipated correctly. "Wanting" usually precedes "liking" in time. Decision makers may therefore have difficulties in accurately scaling predicted utility resulting from their choices (i.e. the future "liking") at the stage at which their "wanting" induces them to take the action. The potential dissociation of liking and wanting also carries implications for the practical measurement of utility which we discuss in Section 5. Section 6 offers some tentative conclusions.

2. The plural aspects of utility

As is well known, in the canonical representation utility derived from taking some action A is conceptualized as a unidimensional variable $u(A)$ which represents an index number. The conceptualization can be given an axiomatic, preference-theoretic foundation if a decision maker's preferences satisfy the conditions of transitivity, convexity, and completeness. Let action A be the choice of a commodity bundle $x \in X$, where X is the commodity space. Let an alternative action B be the choice of the commodity bundle $y \in X$. If the preference relation is also assumed to be continuous on X, there exists a continuous utility function $u(x)$. This function assigns a numerical value to each element in X and thus ranks these elements according to the preferences so that $u : X\ u : X \rightarrow \mathbb{R}$ is a utility function that represents these preferences provided for $\forall x, y \in X : x \succcurlyeq y \leftrightarrow u(x) \geqslant u(y)$ holds ($\succcurlyeq$ denotes a preference relation).

In this conceptualization the reasons motivating the decision makers' orderings are not addressed, even if corresponding information is available.[1] Classical utilitarianism had had an entirely different approach. With its elaborate, empirically informed theory of utility it drew on a remarkable psychological intuition in tracing the action motivation back to sensory origins. Identifying utility with the enjoyment of pleasures or avoidance of pains, Bentham and his followers recognized that an action can trigger different pleasures or pains at the same time. These different pleasures/pains were considered sources of qualitatively different kinds of utility (Warke, 2000). A utility measure was implied here that, unlike in the modern conceptualization

[1] This lacuna extends into the sphere of normative economics and social choice where the satisfaction of abstract subjective preference orderings is assumed to generate "well-being", i.e. is taken as a measuring rod for individual welfare, see Binder (2010).

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