

# Early History of Demand Theory: Anti-Psychologist Thesis Reconsidered

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According to a widely shared view, the development of demand theory in the first half of the twentieth century was heavily influenced by anti-psychological attitudes of economists. I call this view “anti-psychologist thesis” and I criticize it on several grounds. I propose an alternative account, according to which the development of demand theory is best characterized as a process aiming towards greater generality. I provide evidence in favor of this “generalization thesis”, and I trace the cause of disagreements between advocates of these two alternative accounts. I argue that this cause lies in identifying the aim of the demand theory as well as divergent understanding of what it means to “abstract from psychological assumptions”.

Keywords: demand theory; economics and psychology; anti-psychologist thesis; generalization thesis; the law of demand; utility; revealed preference

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The development of the demand theory in the first half of the twentieth century has been described by various authors as a “story of emptying out of human psychology from the theory of rational choice” (Davis 2002, 145), an “escape from psychology” (Giocoli 2003), “de-psychologization” (Ortmann 2005), a “half-century-long flight of neoclassical economics from psychology” (Davis 2011, 8) or a “retreat from psychology” (Ross 2014). As these expressions suggest, demand theory was progressively shifting away from its dependence on specific psychological assumptions. What explains this shift?

According to what I call the “anti-psychologist thesis” (APT), the major cause of this shift were anti-psychological attitudes of economists of the period. According to Lewin (1996, 1296), economists attempted to “rid economics of psychology” as an “unscientific remnant of the past”. Giocoli (2003, 43), claims that economists began to “despise any reference to utility, volition, pleasure and so on”. At least two sources of these attitudes have been identified: logical positivism which set methodological standards that psychology of the early 20<sup>th</sup> century did not meet (Giocoli 2003; Hands 2010), and economists’ “pathological” preferences which manifested themselves through downplaying the importance of other disciplines to economics (Lewin 1996; Rabin 1998).

In present article I critique APT as an inadequate account of the development of demand theory. As an alternative account, I put forward the “generalization thesis” (GT) according to which economists, rather than trying to get rid of intentional psychology, aimed at a greater generality of the theory. If the greater generality was the goal, then economists’ attitudes toward intentional psychology were irrelevant for the development of demand theory. Incidentally, the theory was in fact becoming more “psychology-friendly”, in the sense that it was becoming more and more compatible with increasingly larger set of psychological assumptions. GT can also account for the fact that, economists rarely discussed these assumptions: It was not because of their alleged anti-psychological attitudes (as argued by APT) but because they subscribed to the division of labor between economics and psychology: since the demand theory was becoming gradually less tied with specific psychological views, economists did not

have to resolve issues that were best left to psychologists (Slutsky 1998 [1915]; Robbins 1945 [1932]).<sup>1</sup>

The term “generalization”, as used in this article, refers simply to the repeated use of Occam’s razor. More precisely, I define it as a process, in the course of which less and less restrictive set of assumptions is used to derive the same set of statements.<sup>2</sup> Adam Smith aptly described such process using a machine analogy:

[Philosophic/scientific] systems in many respects resemble machines. [...] The machines that are first invented to perform any particular movement are always the most complex, and succeeding artists generally discover that, with fewer wheels, with fewer principles of motion, than had originally been employed, the same effects may be more easily produced (Smith 1982, 66).

To use Smith’s analogy, I attempt to show that the primary “effect” that the demand theory intended to “produce”, was the law of demand, i.e. the inverse relationship between the quantity demanded of a good and its price. The development of this theory is then driven by discoveries that some “wheels” (such as diminishing marginal utility or the notion of utility as such) are not necessary to produce the desired effect (i.e. to explain the law of demand) and were therefore disposed of. I argue that my story can adequately explain the development of the demand theory and that economists’ attitudes towards psychology played at best a minor role in this development.

APT seems widely accepted; nonetheless, I may not be the only one who sees rifts in it. Several authors have suggested that the relationship between economics and psychology in the first half of the twentieth century was more complex than what is

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<sup>1</sup> Arguably, economics separated from ethics for similar reasons (Knight 1922, 1923; Robbins 1945 [1932]).

<sup>2</sup> Mäki (2001) uses the term “derivational (logical) unification” to describe what I call generalization.

suggested by APT. For instance, Hands (2010) challenges the view that psychology was driven out of demand theory during the ordinal and revealed preference revolutions. In his interpretation, the main role in the development of this theory was played by economists' unwillingness to commit either to a causal science of behavior, or to a notion of human volition. Another example is Giocoli (2003) who without denying the APT, argues that the true engine behind the development of the demand theory is intellectual need of economists to "improve the logical intelligibility of the theoretical representation of economic behavior" (Giocoli 2003, 45). He also claims that economists used catchwords such as behaviorism and operationalism only as a veil to "be free to pursue their search for generality and conceptual integrity through formalist methods" (Giocoli 2003, 38). Giocoli's and Hand's accounts still consider APT important albeit too simplistic; I go further and argue that APT is problematic and its role in explaining the development of the demand theory is small, if any at all. The crucial difference between mine and their accounts is that they assume that the goal of demand theory was to explain behavior; I argue that the aim of the theory was to explain the law of demand, i.e. changes in behavior in response to price changes.<sup>3</sup> I discuss this difference in more detail in Section 1.

Angner and Loewenstein's (2012) historical account of the relationship between economics and psychology subscribes to both APT and GT. On the one hand, these authors argue that there was a "rejection of psychological foundations" by neoclassical economists (Angner and Loewenstein 2012, 650). On the other hand, they also point out these economists "did not deny that people might be motivated by pleasure, pain and/or

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<sup>3</sup> In contrast, Hands (2010) refers to demand theory as "consumer choice theory". Giocoli (2003, 41) speaks of "neoclassical theory of economic behavior" and he claims that its "major theoretical goal" is the "explanation of the individual behavior" (Giocoli 2003, 42).

other mental states”; instead, they “chose to remain agnostic about questions of motivation, preference formation, and choice” (Angner and Loewenstein 2012, 648). The problem is that APT and GT cannot hold at the same time: How does one “reject” psychological foundations and “not deny” them at the same time? In Section 4, I discuss this issue arguing that advocates of APT fail to distinguish between “agnosticism about psychology” and “anti-psychological attitudes”, or more generally, between “precise” and “non-precise” abstractions (Long 2006).

There are accounts of the development of the demand theory which do not focus primarily on the relationship between psychology and economics. Notably, Moscati (2007) argues that this development is regulated by the rule “more realism, but without loss of systematicity”. By “realism” he means consistency of assumptions and implications with common-sense evidence and data; “systematicity” refers to the “power to derive the largest possible set of exact implications concerning a certain phenomenon from the smallest possible set of assumptions.” Systematicity is closely related to what I call generalization, therefore Moscati’s account is broadly in line with GT. Yet, he interprets the attempts to account for the stylized facts of the demand theory without reference to psychological assumptions as a manifestation of APT rather than GT: in particular, he assumes that economists of the early twentieth century were implementing the behaviorist program. I challenge this view in the following section.

## 1 Anti-psychologist thesis: an assessment

Although APT is a hypothesis about the development of a theory, it is usually associated with normative assessment. Advocates of APT not only argue that economics of the first half of the twentieth century has shifted away from psychology, they also argue that this shift was unfortunate. For instance, Lewin (1996) and Bruni and Sugden

(2007) argue that there were unexploited exchange opportunities between economics and psychology. Behind this view, there is an implicit assumption that both psychology and economics attempt to account for behavior and so the lack of cooperation between the two is regarded by the advocates of APT as a puzzle. This puzzle has been labelled “Sen’s paradox” (Lewin 1996): How are anti-psychological attitudes of economists compatible with the fact that economics has to rely on some sort of psychology? The paradox is typically resolved by arguing that economists, under an influence of behaviorism and logical positivism, downplayed the importance of psychology to economics (Lewin 1996; Giocoli 2003; Hands 2010).<sup>4</sup>

Nonetheless, the influence of behaviorism and logical positivism on mainstream economics seems exaggerated. Edwards (2016) even argues that rather than affecting demand theory of the 1930s, behaviorism related to its institutional critics, such as Veblen, Mitchell, and J. M. Clark.<sup>5</sup> Moreover, most economists in the first half of the 20<sup>th</sup> century were neither behaviorists nor positivists (Hands 2010) and methodological arguments specific to these philosophical traditions were not used as the main arguments in theoretical debates. In fact, it is well-known that Hutchison’s (1960) attempt to introduce logical positivism in economics received “less than enthusiastic welcome” (Giocoli 2003, 35). The influence-of-behaviorism/logical-positivism hypothesis does not explain why ordinal utility and revealed preference theories were,

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<sup>4</sup> An alternative hypothesis is that there were no gains from trade between psychology and economics as psychology of the period was just emerging and “was not very scientific” and therefore “economists thought it provided too unsteady a foundation for economics” (Camerer and Loewenstein 2004, 5).

<sup>5</sup> This is the exact opposite of Lewin’s (1996) thesis.

and are today, embraced by non-positivist economists.<sup>6</sup> An account of the history of demand theory must be able to explain why many economists thought (and continue to think) about ordinal and revealed preference revolutions as progress.<sup>7</sup>

According to GT proposed in this article, the aim of the demand theory is not to account for behavior but primarily for the law of demand – i.e. changes of behavior in response to the changes of price. In pursuing this aim, economists attempted to build a theory that would not commit to a particular psychological views and that would be compatible with various psychological foundations. And so although it is perhaps true that economics has to rely on some sort of psychology, economists believed (and subsequently proved) that it does not have to rely on a specific kind of psychology, such as hedonism. Thus, in the course of the development of the demand theory, more restrictive assumptions were replaced with less restrictive ones: Ordinal utility theory generalized cardinal utility theory and revealed preference theory in turn generalized ordinal utility theory. In contrast to GT, APT turns a blind eye to the fact that in the course of its development, demand theory progressively become more compatible with increasingly larger set of psychological assumptions. Furthermore, it cannot explain why the increase in generality occurred as the demand theory developed.<sup>8</sup>

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<sup>6</sup> For instance, the idea that preference is demonstrated by choice embraced by Mises (1996 [1949]) who at the same time was a staunch critic of logical positivism.

<sup>7</sup> As Mirowski (1989, 365) notes, “not one single neoclassical economist today acknowledges that [revealed preference theory] was an abortive or futile program.”

<sup>8</sup> As pointed out by one referee, another reason why APT seems implausible is that it is difficult to imagine that leading economists of the period would put such energy merely into removing psychology from economics. Moreover, if APT is correct, why didn't they spend more time criticizing psychology directly?

Since it has been sometimes argued that ordinal utility theory does not in fact represent a generalization of cardinal utility theory (e.g. Mirowski 1989, 362) and that revealed preference theory is not a generalization of ordinal utility theory (e.g. Wong 2006 [1978]), the next section demonstrates that ordinal and revealed preference revolutions do in fact represent steps towards greater generality. Then, in Section 3, I provide some evidence that economists who played the main role in developing these theories were motivated by the desire for greater generality rather than anti-psychological attitudes. Next, in Section 4, I argue that a careful distinction has to be made between “rejection of psychology” (precise abstraction from psychological assumptions) and “not going into psychological details” (non-precise abstraction from psychological assumption). This distinction marks the difference between APT and GT. Finally, Section 5 discuss possible objections to GT.

## 2 Generalization thesis

When constructing the demand theory, economists of the late 19<sup>th</sup> and early 20<sup>th</sup> primarily attempted to explain the law of demand, i.e. the observation that the quantity of a good demanded decreases (or at least does not increase) as its price increases.<sup>9</sup> More specifically, economists asked under what conditions this law can be derived. What variables must be held constant along the demand curve? What assumptions about consumer behavior are required? I argue that along the way, explanations using more restrictive assumptions were replaced with explanations using less restrictive ones.

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<sup>9</sup> As put by Samuelson (1963 [1947], 97): “[Derivation of demand functions] is the whole end and purpose of our analysis of consumer’s behavior. As has been reiterated again and again, the utility analysis is meaningful only to the extent that it places hypothetical restrictions upon these demand functions.” See also Samuelson (1938b, 347) and Hicks (1986 [1956], 189).

Therefore, the demand theory was becoming compatible with increasingly more psychological views. In this section, I briefly review three main accounts of the law of demand (in chronological order): cardinal-utility-based explanation, ordinal-utility-based explanation and revealed-preference-based explanation. I show that the third explanation is a generalization of the second, which itself is a generalization of the first.<sup>10</sup> I present a rational reconstruction or an “internal history” (Lakatos 1970): I focus on ideas as such rather than on the interpretation of specific economists’ views. In particular, I am looking for the answer to the following question: How would an economist with given analytical tools account for a downward-sloping demand curve? In other words, I ignore the idiosyncrasies of individual authors, which also means that the “typical” answer to this question may not be attributable to a concrete person. An “external history” which discusses ideas of specific authors is the subject of Section 3.

The first important explanation of the law of demand, developed especially by Marshall (1982 [1890]), ran along the following lines:<sup>11</sup>

- (A1) (i) *Maximizing behavior. Consumer compares the utility of various quantities of a good with the utility of various quantities of money. He chooses a combination of the quantity of the good and money which maximizes his total utility subject to his budget constraint.*

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<sup>10</sup> For a related account of the development of the demand theory, see Hudik (2013). See also

Drakopoulos (1990, 365) who argues that economists such as Pareto, Robbins, Hicks, and Samuelson “did not invent a new theory but suggested that the same principles can be constructed without psychological assumptions.”

<sup>11</sup> (A1) relies on the dominant Hicksian interpretation of Marshallian demand theory. For alternative interpretations of Marshall see e.g. Friedman (1949) and Hudik (2019a).

- (ii) *Ceteris paribus* clause. Nominal income and the prices of the goods, other than the one in question, are held constant along the demand curve.
- (iii) *Non-satiation*. Consumer's utility is strictly increasing in the amount of the good and money.
- (iv) *Diminishing marginal utility of the good in question*.
- (v) *Constant marginal utility of money*.<sup>12</sup>
- (vi) *Additively separable utility function*.

To illustrate the logic behind (A1), consider a decrease in the price of a good. By the assumptions (ii) and (v), prices of goods, other than the one in question, and the marginal utility of money are held constant. Therefore, in the consumer optimum, the marginal utility of the good has to decrease as well. This is achieved by increasing the quantity demanded of the good because, by assumption (iv), the marginal utility diminishes with the increase of the quantity of the good, and, by assumption (vi), the quantity of the good does not affect the marginal utility of money. The assumptions (i)-(vi) thus ensure that the law of demand holds (cf. Hicks 1946 [1939], 26).

Although (A1) can account for the law of demand, there are several problems with it. Firstly, it focuses only on one good (the other good being “money”). Therefore, this framework is not suitable for the analysis of complementarity and substitutability

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<sup>12</sup> There are several interpretations of “constant marginal utility of money” (see e.g. Samuelson 1942; Georgescu-Roegen 1968). I follow the Hicksian interpretation of this assumption as quasilinearity of the utility function in money.

between goods.<sup>13</sup> Secondly, contrary to the assumption (v), the marginal utility of money is arguably not always constant. The theory does not apply to the situations in which this assumption is violated. Moreover, as shown by Samuelson (1942), this assumption has several implausible implications, such as income elasticity equal to zero. Thirdly, the concept of utility is not well-defined.<sup>14</sup> Most economists claimed that the term “utility” did not refer to any “real” psychological magnitude. They thought of utility as a theoretical construct that accounted for the fact that something was desired or wanted by the consumer (e.g. Fisher 2007 [1896], 1918; Wicksteed 1970 [1888]; Pigou 1932 [1920]; Davenport 1902).<sup>15</sup> Nevertheless, this formal notion of utility seemed incompatible with the assumption of diminishing marginal utility (assumption (iv)). Moreover, under this interpretation, utility was often defined in a circular way: it was said that a commodity bundle was chosen because it maximized utility and it maximized utility because it was chosen (Sweezy 1934; Samuelson 1938b).

Most of the above-mentioned problems were solved by ordinal utility theory developed mainly by Fisher (2007 [1896]) Pareto (1971 [1906]), Johnson (1913), Slutsky (1998 [1915]), Hicks and Allen (1934a, 1934b) and Hicks (1946 [1939]). This theory accounts for the law of demand as follows:

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<sup>13</sup> This is the case for cardinalism of Marshallian variety. Cardinalism can, of course, dispose of the assumption (vi) (e.g. Edgeworth 1881). The reason I choose the Marshallian version is that it served as a main starting point for the subsequent development.

<sup>14</sup> Hicks (1946 [1939], 12) asks: “...what is this ‘utility’ which the consumer maximizes? And what is the exact basis for the law of diminishing marginal utility? Marshall leaves one uncomfortable on these subjects.”

<sup>15</sup> Hudik (2015) argues that also classical economists thought about utility in this formal sense.

- (A2) (i') *Maximizing behavior.* Consumer decides how to allocate his income across various goods. He chooses the commodity bundle which maximizes his utility subject to his budget constraint.
- (ii') *Ceteris paribus clause.* Nominal income and the prices of the goods, other than the one in question, are held constant along the demand curve.
- (iii') *Non-satiation.* Consumer's utility is strictly increasing in the amount of goods.
- (iv') *Diminishing marginal rate of substitution.* The marginal rate of substitution between each pair of goods  $Y$  and  $X$  diminishes with the increase of the quantity of  $X$ .<sup>16</sup>
- (v') *Substitution and income effects.* The income effect is positive, or it is negative but smaller than the substitution effect.<sup>17</sup>

Can the law of demand be derived from the assumptions (i')-(v')? Consider again a decrease in the price of some good  $X$ . Since by the assumption (ii') the prices of other

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<sup>16</sup> For more than two goods, diminishing marginal rate of substitution has to be generalized to prevent the possibility of profitable substitutions between various combinations of goods at given prices.

Intuitively, the marginal rate of substitution has to diminish in all directions (see e.g. Hicks 1946 [1939], 25). In modern analysis, this assumption has been replaced with alternative assumptions, such as strict quasi-concavity of the utility function.

<sup>17</sup> The substitution and the income effect can be defined in multiple ways. The reason is that there are various possible ways of defining the constancy of real income, such as constancy of utility (Hicks 1946 [1939]), or constancy of purchasing power (Slutsky 1998 [1915]). Usual choice in theoretical analyses is Hicks' definition in terms of constant utility. Mosak (1942) shows that Slutsky's definition of the real income in the limit approximates Hicks' definition. Friedman (1954) reviews various definitions of real income used in demand theory.

goods are held constant, there is also a decrease in the price of the good  $X$  relative to the prices of other goods. Nevertheless, by the assumption (ii'), also the nominal income is held constant, and therefore, there is an increase in the real income. Consider the two effects of the price decrease, one on the relative prices and the other on the real income, in isolation. Since the relative price of  $X$  decreases, consumer optimum implies that the marginal rate of substitution between  $Y$  and  $X$  has to decrease as well. By the assumption (iv'), this is achieved by an increase in the quantity of  $X$  (substitution effect). Now consider the increase in the real income. The increase in the real income may result in an increase in the quantity of  $X$  (positive income effect, the good  $X$  is normal), or in a decrease in the quantity of  $X$  (negative income effect, the good  $X$  is inferior). The total effect of a decrease in the price of  $X$  on the quantity of  $X$  is obtained as a sum of the substitution and the income effect. Nevertheless, under the assumption (v'), the law of demand holds.

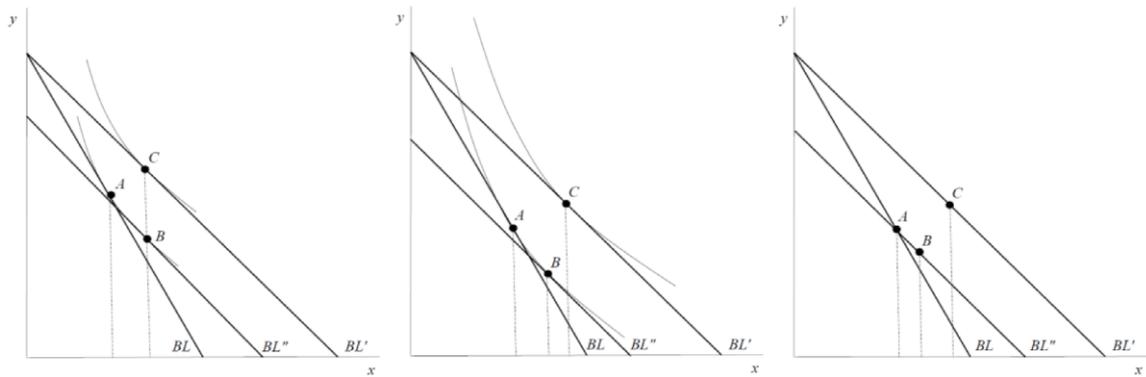
(A2) generalizes (A1) in several ways. First, it explicitly considers more than one good, rather than using “money” to represent all other goods than the one good in question. Consequently, under Hicks’ (1946 [1939]) composite commodity theorem, the approach used in (A1) becomes a special case of the utility function of (A2). Second, (A2) drops the assumption (vi) of an additively separable utility function. These two modifications make a general analysis of complementarity and substitutability between various goods possible. Third, the assumption (v) of constant marginal utility of money is replaced with the assumption (v') about the income effect. In general, (A2) allows for cases when the income effect is negative, which may result in the violation of the law of demand (Giffen behavior). Consequently, (v') needs to be assumed to ensure that the law of demand holds. In contrast, in (A1) the assumptions (v) and (vi), together with the assumptions (i)-(iv), imply zero income effect. Therefore, (A2) generalizes (A1) to the

cases of the non-zero income effect. Fourth, the “law of diminishing marginal utility” (iv) is generalized by the “law of diminishing marginal rate of substitution” (iv'). This new assumption is defined only in terms of first derivatives of the utility function, and therefore, utility can be without contradiction interpreted as a purely formal construct representing consumer's preference scale.<sup>18</sup>

The generalization of (A1) by (A2) is illustrated in Figure 1a and 1b, respectively. Figure 1a shows the case of diminishing marginal utility of commodity  $X$ , constant marginal utility of commodity  $Y$ , and additively-separable utility function. Consider a decrease in the price of  $X$  (a change of the budget line from  $BL$  to  $BL'$ ). The assumptions about the utility function contained in (A1) yield the zero income effect (the optimum quantity of  $X$  under the budget lines  $BL'$  and  $BL''$  is the same). Figure 1b shows a decrease in the price of  $X$  under the assumption of a positive income effect with the restrictions on the utility functions imposed by (A2). The crucial point is that while Figure 1a and 1b are two special cases under (A2), the situation in Figure 1b is outside the scope of (A1). In particular, (A2) does not deny the possibility that the utility function may have properties postulated by (A1).

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<sup>18</sup> Nevertheless, as argued by Drakopoulos (1990), remnants of hedonism remain present in economic textbooks.



a) (A1)

b) (A2)

c) (A3)

Figure 1: Derivation of the law of demand under different assumptions

Although (A2) successfully solved most of the problems of (A1), it continued to use the ambiguous utility concept (or preference concept which faced the same problem of circular definition mentioned above): Since the expression “ $A$  is associated with higher utility than  $B$ ” (or “ $A$  is preferred to  $B$ ”) was interpreted as equivalent with: “ $A$  is chosen over  $B$ ”, one could certainly dispense with the concept of “utility” (“preference”) and build the theory directly on the concept of choice. To use Adam Smith’s machine analogy, there still seemed to be a dispensable “wheel” in the “machine”. This problem was addressed by Samuelson’s (1938a, 1938b, 1963 [1947], 1948) revealed preference theory, which was further elaborated in particular by Little (1949), and Houthakker (1950). The new reformulation of the demand theory enabled to obtain a negative substitution effect merely from assumptions about consumer choices.

(A3) (i) *Weak axiom of revealed preference. A commodity bundle  $A$  is revealed preferred to a commodity bundle  $B$ , if  $A$  is chosen in a situation where  $B$  is*

*available. Weak axiom of revealed preference states that no choice should also reveal B as preferred to A.*

*(ii'') Ceteris paribus clause. Nominal income and the prices of the goods, other than the one in question, are held constant along the demand curve.*

*(iii'') Substitution and income effects. The income effect is positive, or it is negative but smaller than the substitution effect.<sup>19</sup>*

To see how the law of demand can be derived from (A3), consider a commodity bundle  $A$  chosen under given prices and income. Assume a decrease in the price of the good  $X$  accompanied by a compensating budget decrease so that the initially chosen bundle  $A$  is just attainable with the new budget and the new price (the compensating budget decrease isolates the substitution effect from the income effect of the price change). Since the bundles containing a lower quantity of  $X$  than the bundle  $A$  were available at the original prices and budget and yet were not chosen by the consumer, by the assumption (i''), they also cannot be chosen under the higher price of  $X$  and the new budget. Assuming that each set of prices and income uniquely determine each commodity bundle chosen by the consumer, the initial bundle  $A$  also cannot be bought under the new budget and the new price. Therefore, the lower price of  $X$  must be associated with a higher quantity of the good  $X$ . Thus, we obtain the negative substitution effect (Figure 1c). The law of demand is then derived from the assumption

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<sup>19</sup> Note that unlike in (A2)(v'), real income cannot be defined in terms of utility. See also fn. 17.

(i''), together with the ceteris paribus clause (ii'') and the assumption about the income effect (iii'').<sup>20</sup>

The assumption (i') of (A3) replaces the assumption of utility maximization (i') of (A2) and naturally also assumptions imposing restrictions on the utility functions (iii') and (iv'). Since the expression “utility-maximizing alternative” was seen equivalent to the expression “chosen alternative”, the former expression is dropped as redundant. Therefore, (A3) generalizes (A2). This generalization can be illustrated by comparing Figures 1b and 1c. Figure 1c shows the derivation of the law of demand under (A3). Unlike in (A2), it is not assumed that the consumer consults a preference scale or a utility when making choices. However, (A3) does not deny the possibility that consumers may consult preference scales or utilities as postulated by (A2).

The claim that (A3) is a generalization of (A2) has been questioned in literature (Wong 2006 [1978]). After Houthakker's (1950) article which introduced the Strong Axiom of Revealed Preference (a more restrictive assumption than (i'')), it turned out that an individual whose choices are internally consistent in the sense of the strong axiom, acts as if he was maximizing something, i.e. in line with (i'). The two approaches, choice-based and preference/utility-based, can, therefore, be seen as equivalent (this was also Samuelson's position (Samuelson 1953, 1–2, 1998, 1380–81)). Yet there are at least two reasons why to consider (A3) as a generalization of (A2): Firstly, it allows for choice rules other than maximizing, even though these other rules can be described as maximizing. Secondly, and more importantly, if the concepts of “utility” and “preference” are seen problematic for one reason or another, one can point

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<sup>20</sup> Wong (2006 [1978], 46-50) criticizes the revealed preference theory for not being able to explain consumer behavior; this criticism is, however, misses the point because the aim of the revealed preference theory is not to explain consumer choices but the law of demand. See also Hudik (2019b).

to (A3) as the evidence that these concepts are only mathematical conveniences and play no explanatory role in demand theory. Finally, the critical point from the perspective of the GT is that the move from (A3) to (A2) was driven by a search for less restrictive assumptions that would explain the law of demand. The fact that the end-product of this process allows for alternative interpretations is another issue because Samuelson could not predict Houthakker's result.<sup>21</sup>

### 3 Textual evidence

In the previous section, I have shown that the development of demand theory *can be interpreted* as a process aiming towards greater generality; in this section, I provide some evidence that economists who played the main role in the development of the demand theory – Hicks, Allen, and Samuelson – actually cared about greater generality of the theory rather than about rejection of psychology.

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<sup>21</sup> The observation that (A3) calls for a different branch of mathematics led Giocoli (2003) to hypothesize that after the World War II, under the influence of logical positivism and mathematical formalism the image of economics was changing from the “system of forces” view (represented by rationality-as-maximization principle) to the “system of relations” view (represented by rationality-as-consistency principle). While Giocoli's hypothesis finds some support in consumer theory, it does not explain why the “system of relation” view does not dominate in the producer theory. An alternative to Giocoli's account is that the revealed preference approach enabled the use of the new branch of mathematics, rather than the other way round. That said, I do believe that economics was shaped by the use of mathematics as such. In fact, as pointed out by one referee, generalization in the sense of this paper is characteristic for mathematic approach.

### 3.1 *From cardinal to ordinal utility*

In Hicks and Allen's (1934a, 1934b) *Reconsideration of the Theory of Value*, I find nothing suggesting that their aim is to reject psychological assumptions of the demand theory. Instead, there is a remark which illustrates that they considered the move from cardinal to ordinal utility as a generalization of the theory.

It has become increasingly hard to accept Edgeworth's contention that the existence of theories of Public Finance and Industrial Conciliation depending on measurability of utility ought to be regarded as an argument in favor of maintaining that assumption. For its abandonment need not imply the abandonment of these undoubtedly valuable doctrines; it serves instead as a *stimulus to the construction of new theories of wider validity, into which the traditional teaching can subsequently be fitted as a special case*, depending on the introduction of a particular ethical postulate. (Hicks and Allen 1934b, 54n, emphasis mine)

There is further evidence in their other writings. In *Value and Capital*, Hicks makes clear that the notion of cardinal utility was not negated by the new theory:

Now of course this does not mean that if any one has any other ground for supposing that there exists some suitable quantitative measure of utility, or satisfaction, or desiredness, there is anything in the above argument to set against it (Hicks 1946 [1939], 18).<sup>22</sup>

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<sup>22</sup> Similar remark is to be found also in Hicks's *Revision of Demand Theory*: "It is certainly not the case that the econometrist is obliged to believe that utility is purely ordinal. He does not claim to be able to prove a universal negative. If he has some independent reason for believing in the possibility of a cardinal measure, there is nothing in the nature of the econometric problem which can shake his belief. If he sees some advantage, in some other field of research (perhaps altogether outside economics), from assuming a cardinal index of satisfaction, there is no reason why he should not assume it. What

Allen (1936, 120) points out that his and Hicks's reconsideration of the demand theory was an attempt to "develop a theory of consumers' choice on Paretian lines which would be, at the same time, more consistent and more complete than the theory as left by Pareto himself."

Notwithstanding these proclamations, some commentators saw Hicks and Allen's reformulation of the theory differently. For instance, according to Wong (2006 [1978], 19, emphasis mine), "the use of [utility conceived as quantitatively measurable concept] is *declared illegitimate* by Hicks and Allen because Pareto proved that utility is immeasurable from observations of behavior."<sup>23</sup> Wong quotes the following passage from Hicks and Allen to support his claim:

[Pareto proved] that the facts of observable conduct make a scale of preferences capable of theoretical construction...but they do not enable us to proceed from the scale of preference to a particular utility function (Hicks and Allen 1934a, 55; quoted in Wong 2006 [1978], 19).

I do not see how this quotation substantiates Wong's claim: inability to proceed from scale of preferences to a particular utility function is merely a statement of a fact which does not necessarily mean that utility is illegitimate. The evidence provided above speaks in favor of the hypothesis that Hicks and Allen did not think about cardinal utility as an illegitimate concept, or at least they did not use it as the motivation for their

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does have to be maintained is that the special properties of a cardinal index are irrelevant to the econometric theory of consumers' behavior" (Hicks 1986 [1956], 8–9).

<sup>23</sup> Similar claim is made also by Lewin (1996, 1310): "Treated historically (in the sense of its place in the history of economic thought) or rhetorically, Hicks and Allen (1934) was clearly part of the antipsychological movement within mainstream economics, and it brought economic theory one step closer to eliminating all psychological elements." Moscati (2007) argues that Hicks-Allen paper "belongs to the behaviorist camp".

reformulation of the demand theory.

### *3.2 From ordinal utility to revealed preference*

Let us now examine the revealed preference revolution. Samuelson opens his paper introducing revealed preference theory with an interpretation of the development of demand theory which corresponds to the interpretation presented in this paper:

From its very beginning the theory of consumer's choice has marched steadily towards greater generality, sloughing off at successive stages unnecessarily restrictive conditions (Samuelson 1938a, 61).

It appears that Samuelson thought about his theory as another step in this march towards greater generality. In particular, he made clear that revealed preference theory “does not preclude the introduction of utility by any who may care to do so” (Samuelson 1938a, 62). In line with this claim, he concludes:

Woe to any who deny any one of the three postulates here! For they are, of course, *deducible as theorems from the conventional analysis*. They are *less restrictive* than the usual set-up, and logically equivalent to the reformulation of Hicks and Allen (Samuelson 1938a, 70, emphasis mine).<sup>24</sup>

Yet, the issue is not clear-cut: in opposition to these claims, Samuelson elsewhere speaks about the “progressive movement toward the *rejection* of hedonistic, introspective, psychological elements” (Samuelson 1938b, 344, emphasis mine). Furthermore, he also famously proposes to drop off the “last vestiges of the utility analysis” (Samuelson 1938a, 62). This last line has been often interpreted as manifestation of Samuelson’s behaviorist views. For instance, according to Hands

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<sup>24</sup> It should be pointed out that Samuelson was not an advocate of pursuing generality at any price. See his remarks in Samuelson (1950, 374) and Samuelson (1998, 1381n).

(2008, 466),

[Samuelson's original paper on revealed preference theory] was an effort to move consumer choice theory completely away from the notion that consumers have preferences or utility functions governing their behavior, and to replace the entire earlier theoretical apparatus with a purely *behaviorist* theory.

As he further puts it, “[Samuelson's (1938a)] purpose was to eliminate all reference to preferences or other BAD notions” (Hands 2008, 467, capitalization in the original). My own reading of Samuelson (1938a) is different:<sup>25</sup> Samuelson wanted to drop off the last vestiges of the utility analysis not because utility is “BAD” but because it lacks explanatory power: if “utility maximizing alternative” is defined as “chosen” alternative, then utility maximization cannot explain choice behavior. As Samuelson puts it:

The discrediting of *utility* as a psychological concept robbed it of its only possible virtue as an *explanation* of human behavior in other than a circular sense, revealing its emptiness as even construction (Samuelson 1938a, 61, italics in the original).<sup>26</sup>

He then invokes the argument mentioned in the previous section, namely that ordinalist approach faces exactly the same problem of circularity of definition as cardinalist approach:

Even on the advanced front we are confronted with this dilemma – either the argument with respect to indifference varieties is circular or to many people inadmissible (at least without further demonstration) (Samuelson 1938a, 61).<sup>27</sup>

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<sup>25</sup> See also Mongin (2000) and Moscati (2007, 145) for a similar reading of Samuelson (1938a).

<sup>26</sup> Samuelson (1938b) is even more explicit on this issue. For instance, he writes: “That some modern formulations of the utility concept are empty, circular, and meaningless in the above sense, is hardly open to doubt” (Samuelson 1938b, 344). See also Samuelson (1963 [1947], 91–92).

There are two additional reasons to believe that Samuelson's primary motivation was to achieve greater generality of the demand theory rather than to impose behaviorism on economics.<sup>28</sup> Firstly, Samuelson does not refer to behaviorist literature to "sell" his theory to fellow economists (cf. Lewin 1996; Hands 2010). Secondly, if we accept that Samuelson's early motivation was primarily anti-psychological, then there seems to be inconsistency in his writings: At first he proposes revealed preference theory to drop off the "last vestiges of the utility analysis", while later he thinks of the same theory as a part of the program of "arriving at the full empirical implications for demand behavior of the most general ordinal utility analysis" (Samuelson 1950, 369 emphasis in the original) (this potential inconsistency in Samuelson's writings is discussed at length by e.g. Wong (2006 [1978]) and Hands (2014)). If Samuelson was motivated mainly by the desire to achieve greater generality, then the problem of inconsistency disappears.

#### 4 Possible causes of disagreement

Having laid down my arguments in favor of GT, I now attempt to trace the cause of disagreement between my interpretation of the development of demand theory and the APT.

One possible source of disagreement is that any statement suggesting that psychological considerations are not relevant for the demand theory (and one can of course find many of them) is automatically interpreted as evidence supporting APT

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<sup>27</sup> According to Wong (2006 [1978], 50), Samuelson did not identify explanation as a major result of ordinal utility theory and concludes that Samuelson misunderstood this theory. In fact, Samuelson argues that utility (whether cardinal or ordinal) cannot be used to explain behavior unless it is defined independently of behavior.

<sup>28</sup> Edwards (2016), provides further evidence that Samuelson cannot be considered behaviorist.

without examining the arguments advanced in favor of these statements. In contrast, I argue that the attempts to avoid psychological considerations were driven by the belief that these psychological considerations were—to use again Smith’s machine analogy—unnecessary “wheels” in the “machine” of the demand theory. In my interpretation, economists aimed at a theory which would be general in the sense that it would be compatible with various psychological assumptions. For instance, Slutsky writes:

...if we wish to place economic science upon a solid basis, we must make it completely independent of psychological assumptions and philosophical hypotheses (Slutsky 1998 [1915], 3).

This quotation seems to support APT; however, Slutsky continues:

On the other hand, since the fundamental concept of modern economics is that of utility, it does not seem opportune to disregard all connections existing between the visible and measurable facts of human conduct and the psychic phenomena by which they seem to be regulated. *Utility must therefore be defined in such a way as to make it logically independent of every disputable hypothesis or concept, without however excluding the possibility of further research regarding the relations between the individuals conduct and his psychic life* (Slutsky 1998 [1915], 3–4 emphasis mine).

I read this as an evidence for the GT: Slutsky is simply delimiting borders between economics which does not go into the details of individual decision making and other disciplines. Slutsky does not suggest that the research of individual “psychic life” is illegitimate or unscientific.

But there seem to be a more fundamental difference between my interpretation of the development of demand theory and the advocates of APT: According to my interpretation, as the demand theory developed from cardinal utility approach to revealed preference approach, it used less and less restrictive assumptions, and was thus

becoming in a sense increasingly “psychology-friendly”. In this interpretation, the concept of ordinal utility does not mean that utility is not cardinal; it means that utility *may or may not* be cardinal. Likewise, the revealed preference approach by avoiding psychological concepts does not deny the existence of preference scales or utility; according to this approach, consumers *may or may not* have preferences or utilities.

Advocates of the APT seem to think about the issue differently: in their interpretation, the concept of ordinal utility means that utility is positively not cardinal, and the avoidance of psychological concepts in revealed preference theory is interpreted as a denial that people have minds (cf. e.g. quotations from Wong (2006 [1978], 19) and Hands (2008, 466) in the previous section). To use the old distinction revived by Long (2006), advocates of the APT interpret abstraction as “precisive” (i.e. characteristics abstracted from are *specified as absent*), while I interpret abstraction as “non-precisive” (i.e. characteristics abstracted from are *absent from specification*).

To rephrase the argument of this article in these terms: I have argued that there was no de-psychologization of the demand theory in the precise sense (rejection of psychology); instead there was a “de-psychologization” in non-precise sense (not going into details of psychology). It is, however, misleading to speak about “de-psychologization” in this latter sense (hence the quotation marks) since this process was not a manifestation of anti-psychological attitudes, but rather a matter of division of labor. Economic theory was seen as a complement to psychology rather than a “more scientific” alternative.<sup>29</sup>

I have attempted to show that the demand theory developed in the first half of the 20<sup>th</sup> century is a well-argued (though not perhaps unproblematic) explanation of the

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<sup>29</sup> For more on this issue from a methodological perspective and with reference to modern debates, see Hudik (2019b).

law of demand for which there did not seem to have been a superior alternative. Nevertheless, there are questions for which this theory does not provide an answer. For instance, this theory does not provide an explanation of choice behavior, (e.g. Wong 2006 [1978], 46–50)<sup>30</sup> or it does not portray human beings accurately (Lewin 1996, 1317). However, it is illegitimate to criticize a theory for not being able to answer questions which it did not aim to answer: the fact that revealed preference theory is inadequate theory of choice behavior does not invalidate it as a theory of demand.<sup>31</sup> On the other hand, it is perfectly legitimate to preach that economists should ask different questions than they do.

This point can be well illustrated by the works of Wesley Clair Mitchell's who as early as in 1910 realized that the issue is not that the economists studying demand theory disagreed with psychologists. As he puts it:

Anyone who challenges the worth-whileness of the mechanics of self-interest [as exemplified by the works of Jevons, J. B. Clark and Fisher] may find that its exponents can admit everything which [social psychologist] McDougall urges without impairing the logical coherence of their system, and without impairing their own confidence in its scientific merits (Mitchell 1910a, 110).

His argument was not “do what you do differently” (give different answers) but “do something else” (ask different questions).<sup>32</sup> Mitchell wanted economists to change the focus of their interest especially towards the study of institutions by which term he meant “psychological entities – habits of thought and action prevailing among the

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<sup>30</sup> For an argument that economics is not a science of behavior, see Hudik (2011).

<sup>31</sup> As pointed out by Hands (2012, 1105), “[rational preference theory] can be good economics without being a good methodological template for all of choice theory.”

<sup>32</sup> In other words, he saw the problem on the demand side, not on the supply side of the market for ideas.

communities under observation” (Mitchell 1910a, 112). For example, he argued:

Technical methods in industry, and accounting as a method of control, are things which the race has learned by slow degrees. To understand the present situation it will not suffice to take these methods for granted. On the contrary, it is one of the economist’s chief tasks to account for them. The like holds true of all the great economic institutions, such as the capitalistic organization of business enterprise, the use of money, private property, the economic responsibility of the individual. It holds true further of the ultimate psychological traits of human nature, with which the economist sets out (Mitchell 1910b, 201).

Mitchell’s argument boils down to a complaint that most economists of his time were interested in different questions than him. For better or worse, he did not succeed in persuading them to change their focus.

## 5 Potential objections to GT

There are two potential objections to GT as presented in this article. One objection may be that my account (just like APT) is too simplistic in seeing increasing generality as the dominant factor in the development of the consumer theory; it could be argued against my account that reality was much more complex and that other factors played role.

I readily accept that different economists may be motivated by different considerations in their research – in this sense, the multi-causal account is correct. However, my concern is not primarily with various motivations of single individuals (although I examined motivations of some of them in Section 3); instead, my aim is to account for the “market level” which individuals have only limited power to influence: I am interested in the question why some ideas came to be accepted by the professional community, while others did not. In this sense, I consider my mono-causal account adequate. GT can fully explain the development of demand theory from cardinalism to

revealed preference. In contrast, I do not find any evidence, that approaches to demand theory were rejected because they were “too psychological” as implied by APT.

Second possible objection is that my story is based on the assumption that the law of demand was the primary concern of economists developing demand theory; nevertheless, it could be argued that there were other issues that economists considered equally important.

I certainly do not deny that there were other concerns than the law of demand; for instance, I have already mentioned that one of the weaknesses of (A1) was that it did not allow for the analysis complementarity and substitutability of goods, or situations, where income elasticity is different from zero. Admittedly, there are some concerns, such as welfare analysis, that I do not mention in my story at all: For example, Lange (1934) was willing to accept ordinal utility theory as a basis of demand theory but argued for preserving cardinal utility as the basis of welfare considerations. Hicks (1986 [1956]) also considered applications of demand theory to welfare economics important.

The reason why these and other areas are not part of my story, is that both ordinal utility and revealed preference theories were first developed to address the issues of the demand theory and their application to the problems of welfare economics came only later.<sup>33</sup> To be sure, the debates about welfare issues were important for the acceptance of ordinal utility and revealed preference approaches and could have pushed

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<sup>33</sup> For a similar reason is the application of utility theory to welfare economics left out by Stigler (1950a, 1950b) in his survey of the field. As he points out, “most economists of the period [i. e. 1776-1915] used utility theory primarily to explain economic behavior (particularly demand behavior) and only secondarily (when at all) to amend or justify economic policy” (Stigler 1950a, 307). In my view, this is also true for the years 1915-1950, notwithstanding the fact that there were important contributions to welfare economics in this period.

the development of consumer theory to a different direction. Nevertheless, they did not, because it turned out that welfare economics could be built on the basis of these approaches. I therefore left them out of the story to keep the scope of the article in manageable proportions.

## 6 Conclusion

In this article I challenged the rejection-of-psychology account of the development of the demand theory and proposed the generalization account as an alternative. I have shown that the GT is not only consistent with the facts but also that it does not suffer from the problems which beset the APT. In particular, it does not assume that economists ignored potential benefits from cooperation between economics and psychology.

My conclusion is that demand theory as developed by Hicks, Samuelson and others, gives adequate answers to certain specific questions; but whether these questions are the only ones, or the most important ones that should have been asked, is another issue. If the discontent with the development of the demand theory is re-phrased in this way, then one may consistently hold the view that this theory is a formidable achievement while at the same time one may wish that intellectual resources available in the first half of the 20th century would have been allocated differently.

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