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Experience of limited attention and information stress is familiar from everyday life. Attention psychology distinguishes between endogenous (or voluntary) and exogenous (or non voluntary/automatic) control. In *Kahneman's* [1973] words: Voluntary attention means that "the subject attends to stimuli because they are relevant to a task that he has chosen to perform" (p. 4), whereas involuntary attention is related to the level of arousal which "is largely controlled by the properties of the stimuli to which the organism is exposed" (p. 3). The former is also addressed as "top-down control" of attention while the latter is called "bottom-up processing". Both are important: "Channel selection is guided by top-down influences (e.g. current goals) as well as bottom-up influences (e.g. stimulus intensity)" (*Lachter, Forster and Ruthruff* [in Press], p. 2). In recent years, several economists have taken up the problem of limited attention and attention seeking<sup>1</sup>, which *Camerer* [2003] listed among the important topics for behavioral economics. These studies shed light on the aspect of goal-driven voluntary attention allocation. *Gabaix and Laibson* [2004] speak of directed cognition. The main focus is on the processing of a crowded agenda (receiver perspective): How do individuals allocate a given time budget on different sources of information (*Gabaix, Laibson and Moloche* [2003])? Which parts of macroeconomic data should rational agents evaluate if limited information-processing

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<sup>1</sup>Also authors from other scientific fields have begun to study the consequences of limited attention. For instance, an account of the art of achieving attention by scientific publishing is given by *Klamer and van Dalen* [2002]. *Davenport and Beck* [2001] deal with attention from the perspective of business economics. Also *Shapiro and Varian* [1999] discuss business strategies for attracting attention. *Hirshleifer, Lim and Teoh* [2002], and *Hirshleifer and Teoh* [2003] analyze the implications of limited attention of investors for firms' information policy and the financial market equilibrium. *Dukas* [2004] reviews the evolutionary causes of limited attention and its role for the fitness of animals. And, the most salient proof of a new and severe problem of information congestion – the flood of spam – has induced computer scientists to pay attention to the "market for attention". One of the ideas is to implement such a market in a quite conventional way by requiring postage for E-mail. *Kraut et al.* [2002] did first laboratory experiments on the effectiveness of such proposals.

capacity forces them to discard part of the data (*Sims* [2003])? How often do inattentive producers or consumers update their information for adjusting prices or savings plans (*Reis* [2004 a,b])?<sup>2</sup> My contribution is complementary. It focusses on automatic attention control by stimulus strength. The active part is played by the attention seekers – the firms – rather than by the individuals paying attention. Goal-oriented information processing requires some prior knowledge on the information sources.<sup>3</sup> Without prior knowledge, to focus on important rather than on irrelevant signals would require valuation of all signals in the first place. Limited attention means that this is impossible. In contrast, information content does not matter in the approach of this paper which focusses on attention control by stimulus intensity. In such an approach the interest shifts from the consumer to the supply side. How ”strong” must an information source send to have impact (sender perspective)? How many different sources are perceived (i.e. survive) if all of them compete for attention by sending ”look at me!” (equilibrium diversity)? The paper explains individually perceived diversity (local diversity), aggregate diversity (perceived by an outside observer or ”global traveller”) and the distinctiveness of the choice sets of different consumers.

The psychological fact of limited attention capacity does not automatically imply that attention is a scarce resource that restricts economic behavior. As *Herbert Simon* has pointed out, the new scarcity problem arises in an information-rich economy. Information ”consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention.” (*Simon* [1971, p. 40]). One purpose of this paper is to explain scarcity of attention endogenously: Which changes in psychological and technological fundamentals turn an information-poor economy, in which only the economic resources

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<sup>2</sup> *Gabaix and Laibson* [2002] show how the equity premium puzzle can be explained by limited investor attention.

<sup>3</sup>For instance, in the experiments of *Gabaix, Laibson et al.* [2004] subjects know that boxes farther to the left contain more information than boxes at the right side. In the context of time series, properties like frequency or serial correlation can provide guidelines for which signals should be tracked and which should be ignored.

























































































