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Data Visualization

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### **Perception and Graph Types: Article Discussion**

The first article, *Perception in Visualization*, stresses the importance and role that perception plays in data visualization. Furthermore, the article goes on to discuss concepts and theories that offer explanation as to how information is perceived visually. Pre-attentive processing is a particular concept the article addresses in great detail. Defined as the unconscious gathering of visual information from one's environment, pre-attentive processing allows information with the strongest visual stimulus to process first in the queue of information. One stimulus may be stronger for one person and weaker for another– the reason generally being a combination of the stimulus itself as well as that person's current goals and intentions. The article specifically discusses five theories of pre-attentive processing: the Feature Integration Theory, the Similarity Theory, the Texton Theory, the Guided Search Theory, and the Boolean Map Theory.

To demonstrate pre-attentive processing, the article makes use of several juxtaposed figures with small discrepancies between the two images. Distinctions such as color, curvature, and shape are used to illustrate how the human visual system handles information that is displayed differently. More specifically, the figures demonstrate instances where information can be pre-attentively processed as well as cases in which the information cannot be processed pre-attentively.

The article lists several pre-attentive visual tasks that we as humans make use of daily, such as target and boundary detection, region tracking, counting and estimation. While pre-attentive processing begs the question, “What visual properties draw our eyes, and therefore our focus of attention to a particular object in a scene?”, post-attentive processing asks “What happens to the visual representation of an object when we stop attending to it and look at something else?” The article closes with succinct descriptions of how the perceptual assets of color, texture, motion, and non-photorealism are used in visualization.

The article, *Effectively Communicating Numbers*, discusses the poorly designed graphs often used in today’s business environment and how they can even reach the point of misleading their viewers. The reason for this, according to the author, is that “almost no one who produces them, including specialists such as financial analysts and other report developers, have been trained in effective graph design.” The article goes on to give direction towards correcting common flaws in graph design so that your data and intended message may be clearly visualized. Amongst the problems with graph design today, is a lack of understanding between the uses of tables and graphs. While tables are most appropriate when the display will be used find singular values or the quantitative values need to be exact. Graphs tend to be best when the intended message “resides in the shape of the data (that is, in patterns, trends, and exceptions)” Another important distinction the article emphasizes is between

categorical and quantitative data. Quantitative Data is data which is measurable or quantifiable, such as length, weight, etc, whereas categorical (qualitative) data is grouped according to some common property and the number of members of the group are recorded. Furthermore, the three types of categorical scales are outlined in the article. Nominal, ordinal, and interval scales each have their own set of specific instances in which the data is displayed on a certain scale. The article concludes by describing Seven Common Relationships In Quantitative Business Data and goes on to discuss best practices for communicating your graphed data in a concise, non-distracting manner.