

Psychology

Probability and Frequency Estimations in Different Judgemental Contexts

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ABSTRACT. Characteristics of probability and frequency estimations are studied in different judgemental contexts. It is shown that judgemental context influences these estimative forms differently: probability estimations, in comparison with frequency estimations, are more changed. Properties of these estimations are determined by the psychological phenomenon of simultaneous contrast. © 2008 Bull. Georg. Natl. Acad. Sci.

Key words: probability estimation, frequency estimation, judgemental context, simultaneous contrast.

Contemporary research has revealed that both qualitative and quantitative assessments of uncertainty are not carried out in logically coherent fashion. These estimations are influenced by a variety of processes: application of heuristics, domain-specific reasoning, intuitive statistical induction. The uncertainty is usually expressed in verbal terms. Subjective probability is nonextensional, hence the processes of estimation and choice are lexicographic. Like the measured length of physical extension (e.g. a borderland) which increases as a map becomes more detailed, the subjective probability of an event increases as its description becomes specific. The fact concerning the lexicographic nature of the estimation is undoubtedly the main problem of subjective probability assessment. The problem is especially severe in tasks that require the generation of new hypotheses. The realization of the extensionality principle in real-world situations is practically unachievable because people can divide a category (e.g. an implicit conjunction) into its parts but they cannot be expected to take into account all relevant future events [1].

Previous empirical studies have identified the factors that influence the frequency estimations in a wide variety of situations. Frequency estimation is a process through which people assign numerical values

to properties of events. From the estimator's perspective, these values are estimations because true value is unknown or arbitrary. Some exist only within the context of experiment (e.g. the length of a line), others involve more enduring properties of the external world (e.g. the probability of dying by particular causes). The integrative analysis of the metric and mapping processes provides the perspective for thinking about causes of everyday frequency estimations. The principal assumption is that estimations are derived from the knowledge of the distribution of frequency values in the domain (metric information) and the knowledge of the relative positions of particular entities within that distribution (mapping information). The applied significance of this view is that people need to learn some quantitative facts, but not a vast number of them. Instead, it should be possible to promote a good degree of frequency understanding to relatively small, carefully selected, sets of such facts. The real-world frequency estimations are essential for understanding the social and physical environments [2].

A general theoretical approach is not a substitute for domain-specific concepts. New fruitful hypotheses are more likely to arise from thinking about actual ques-

Table 1

Means and Standard Deviations of Probability – Frequency Estimations in Different Judgemental Context

Causes	Probability estimations					Frequency estimations				
	Primary measure and change					Primary measure and change				
	M	SD	M	SD	d	M	SD	M	SD	d
Frequent	7.22	0.82	7.81	0.94	0.59*	7.11	0.64	7.34	0.81	0.23
Rare	2.83	0.95	2.36	0.84	0.47*	3.39	0.68	2.98	0.79	0.41*

tions at a lower level of analysis and abstraction. However, a general approach can be useful to identify common processes and prevent overly narrow interpretations of results [3]. The simultaneous contrast effect is revealed on two levels: perceptual estimation (e.g. the perception that an area of given luminance appears brighter when surrounded by a dark area than when surrounded by a light area) and categorical estimation (e.g. when a disease in comparison with a lighter disease is estimated heavier and a heavy disease is estimated lighter) [4]. The simultaneous contrast illustrates three important points: first, a great deal of neural processing of the visual world (the level of perceptual estimation); second, much verbal experience involves interpretation of the environment (the level of categorical estimation); third, people respond primarily to abrupt changes in the environment. In one of our previous researches the property of semantic asymmetry within the estimation process of similarity and dissimilarity was tested. It revealed that direct relation between similarity and difference does not always take place [4].

We studied experimentally the tie of probability and frequency estimations within different judgemental context. 102 subjects were asked to estimate the likelihood of death from a variety of causes (e.g. cancer, suicide, terrorism). Half of the subjects considered a single person who had recently died and assessed the likelihood that he or she died from each in a list of specified causes. The other half, given a frequency

estimation task, assessed the percentage of the deaths in the previous year attributable to each cause. Two forms of causes were used, frequent (e.g. heart diseases, auto accidents) and rare (e.g. flood, fire). At the second stage of estimation research the following two forms of judgemental context were used either “frequent-rare” (e.g. cancer vs. diabetes), or “rare-frequent” (e.g. product poison vs. heart diseases).

The Table data show that judgemental context had statistically significant influence on probability estimations which concern two of the mentioned forms of the death causes. In the case of frequency estimation, judgemental context had significant influence only on rare causes’ estimations. It means that primary probability estimations of frequent causes, compared with primary frequency (the percentage) estimations of frequent causes, changed essentially. If we propose that events of death causes are highly salient subjectively, the received empirical results will indicate that when making frequency estimations, compared with probability estimations, the subjects are oriented to certain human population, indicating that the subjects’ primary estimations are relatively stable.

The above-mentioned data also point to the fact that in frequency estimation situation, unlike probability estimation condition, the subjects are based on more stable and adequate judgemental criteria. In rare causes estimations the revealed effect was determined by those criteria. Finally, specific estimation of the causality of the studied events was determined by categorical simultaneous contrast effect.

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ნაშრომში შესწავლილია მსჯელობის სხვადასხვა კონტექსტში მიმდინარე ალბათური და სიხშირეობრივი შეფასებების მანასიათებლები. ნაჩვენებია, რომ მსჯელობის კონტექსტი შეფასების ამ ფორმებზე განსხვავებულად ზემოქმედებს: ალბათური შეფასება, სიხშირეობრივ შეფასებასთან შედარებით, უფრო ცვალებადია. ამგვარ შეფასებათა თავისებურება ერთდროული კონტრასტის ფენომენით არის დეტერმინირებული.

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