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Consistency of Monomial and Difference Representations of Function Arising from empirical Phenomena

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Choice probabilities in the behavioral sciences are often analyzed from the standpoint of a difference representation such as P(x,x,y)=F[u(x,x)-g(y)]. Here, x and y are real, positive vector variables, x is a positive and variable, P(x,x,y) is the probability of choosing alternative (x, x) over alternative y, and u, g and F are real valued, continuous functions, strictly increasing in all arguments. In some situations (e.g., in psychophysics), the researchers are more interested in the functions u and go than in the function F. In such cases, they investigate the choice phenomenon by estimating empirically the value x such that P(x,x,y)=p, for some values of p, and for many values of the variables involved in x and y. in other words, they study the function (satisfying ((x,y;p)=x (P(x,x,y)=p. A reasonable model to consider for the function (is offered by the monomial representation ((x,y;p) = in which the i 's the j's and C are functions of . In this paper we investigate the consistency of these difference and monomial representations. The main result is that, under some background conditions, if both the difference and the monomial representations are assumed, then: (i) all functions (must be constant; (ii) if one of the functions for some constants (j >0 (1 m) and ((0, where F-1 is the inverse of the function f of the difference representation. surprisingly, F can be chosen rather arbitrarily.