

The Complexity of Advice-Giving

Advice-giving about personal problems is a common form of human interaction. However, an open question is whether there is an abstract and general logic that explains how advice-giving works. In this study, we addressed this question from the perspective of dynamical systems. We measured the nonlinear dynamics of advice-giving by using recurrence quantification analysis. Analyzing 600 texts of request for advice and the advice given, our results uncover a typical logic of advice-giving, and suggest that advice-giving may be understood as a dynamic manipulation of perspective-taking. © 2009 Wiley Periodicals, Inc. Complexity 15: 28–30, 2009

Key Words: complexity and social sciences/psychology; advice-giving; nonlinear dynamics; recurrence quantification analysis; perspective-taking

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From the biblical Ahitophel to the modern advice columnist, advice-giving on personal problems is one of the most common forms of human interaction. Several strategies of advice-giving have been identified [1]. However, the big question remains whether, beyond the particularities of the psychological and linguistic techniques of advice-giving [1, 2] there is a general logic that explains how advice-giving works. Here, we address this challenge through the perspective of dynamical systems.

Advice-giving may be considered as a process of perspective-taking [3, 4] in which the advisor moves between different perspectives (e.g., your perspective, his perspective) to improve the advice-seeker's awareness and understanding of her/his situation. The dynamics of this process, which is clearly nonlinear, has never been quantified. As the use of personal pronouns (e.g., "I," "him," and "they") has been shown to be indicative of perspective-taking even among toddlers [5, 6], we analyzed advice-giving through dynamic patterns in the usage of personal pronouns and hypothesized that different dynamic patterns would be found in the advice and in the request for advice.

RECURRENCE QUANTIFICATION ANALYSIS

We measured the dynamics of advice-giving by using recurrence quantification analysis (RQA), a relatively novel method of nonlinear data analysis for the investigation of dynamical systems [7–9]. RQA is a method of nonlinear data analysis which quantifies the number and duration of recurrences of states of a dynamical system with several measures of complexity. A recurrence is defined as a case in which the spatial distance between two points on the phase space trajectory is below a given threshold. The main advantage of RQA is that it can provide useful information even for short and nonstationary data (such as our pronouns series)

where other methods fail. RQA is a promising and powerful method of data analysis although it has been seldom used for the analysis of behavioral data [8, 10, 11].

METHOD

Materials

Our data were gathered from three major sites of advice-giving. The sites were chosen to represent different popular sites of advice-giving. The first site (<http://www.loveadvice.com>) is managed by Dr. Tracy Cabot, a psychologist, who sold over a million copies of her advice books. The second site (<http://www.wayneandtamara.com>), managed by Wayne and Tamara Mitchell, began in April 1999 and within 2 years appeared in newspapers in more than a dozen countries. The third site (<http://www.advicegoddess.com>) is managed by Amy Alkon, who writes an advice column which is published in more than 100 newspapers in North America.

From each site we downloaded 100 pairs of a request for advice (Req.) and advice given (Adv.). The data was collected, respectively, to the publication method of each site. In the first and third sites, 100 pairs were drawn from the most recent article backward by publication order. In the second site we used the advice index, which is alphabetically organized, and randomly sampled pairs from each entry of the index.

Procedure

For each Req. and Adv., we constructed a time-series comprised of the personal pronouns that appeared in the text according to their order of appearance. The pronouns were: *I, we, you, he, she, they, me, us, him, her, and them*. The sequences consisted of unique integers, 1 for each of the 11 pronouns, which were presented as found in the text. The threshold was

set to 0 meaning that only identical pronouns would recur with themselves not others.

We analyzed each of the 600 time-series through RQA by focusing on the following measures [7, 8]: the probability that pronouns recur in a time-series (recurrence rate REC), the probability that recurrent pronouns further recur (determinism DET), how many times the recurrent pronouns further recur (LMAX), and the complexity of the recurrent pronouns (entropy ENT). Determinism is of special interest as it may point to the underlying dynamics of the system and whether it is *periodic, chaotic, or stochastic* [8]. The same is true for the LMAX that inversely scales with the Lyapunov exponent; the smaller the value of LMAX the more “chaotic” is the behavior of the series [8]. The ENT measure is a measure of the signal’s complexity based on Shannon’s information entropy.

For the analysis, we used CRP Toolbox 5.5 developed by Marwan [12] and RQA Software 9.1 developed by Webber [13]. As parameter for the analysis we set the recurrence threshold = 0 (no embedding for reconstruction of higher dimensional system was performed).

RESULTS

Figure 1 presents the averages of the measures in Req. and Adv. across the three corpuses.

On average, the measures were significantly higher on the advice than on the request for advice. By using the *t*-test for paired samples, the differences were found statistically significant for REC ($t(278) = 11.10, P < 0.001$), DET ($t(278) = 11.54, P < 0.001$), LMAX ($t(278) = 6.94, P < 0.001$), and ENT ($t(278) = 9.01, P < 0.001$). Across corpuses, the average length of the series was higher in the request for advice ($M = 28.33, SD = 15$) than in the advice ($M = 23.66, SD = 8.66$). This finding further strengthens our results

and avoids a possible criticism that the higher rates of recurrence were accepted as a result of longer series in the advice. As the sequences were relatively short and the number of pronouns limited, comparing the recurrence variables to those produced through randomized times series was an irrelevant option.

DISCUSSION

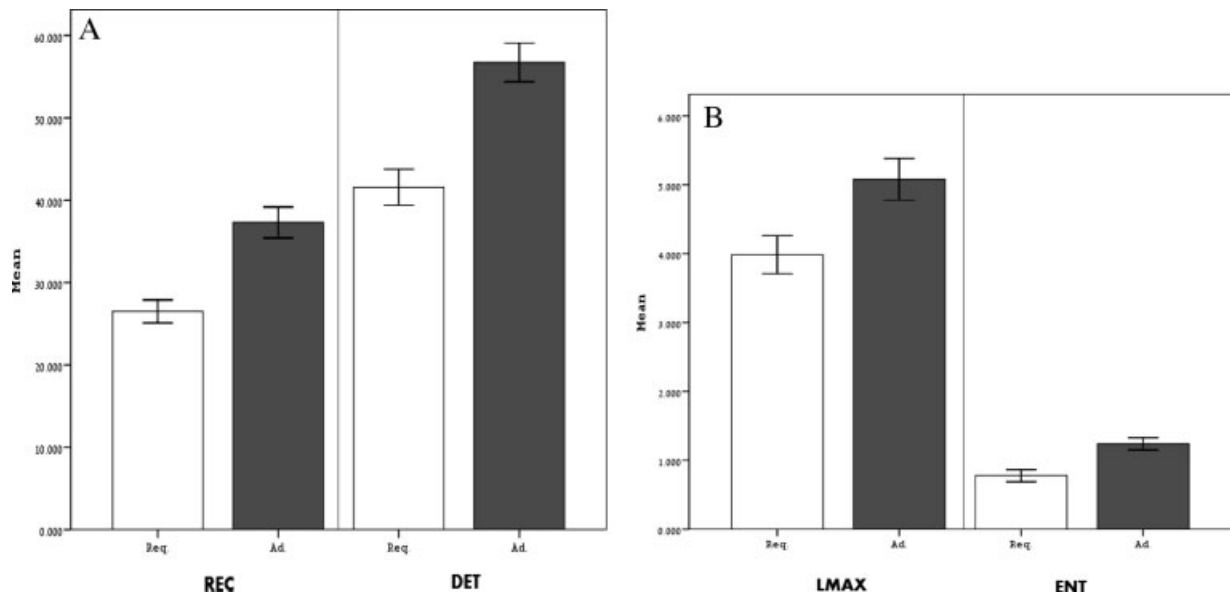
Our analysis shows that beyond the enormous variety of content and style, patterns of perspective taking, as measured through time-series of personal pronouns, were more regular, deterministic and complex in the advice than in the request for advice, which presents a more “chaotic” behavior. These results are far from trivial because an opposite pattern could have been expected. For example, it is known that in emotionally vulnerable situations people use of the first person pronoun “I” is higher [5]. Therefore, higher levels of the measures could have been expected in the Req. because of the intensive use of this pronoun.

Our results suggest that advice-giving has an interesting and nontrivial dynamical aspect of manipulating perspective-taking. In other words, it has an underlying and general nonlinear dynamics in which the advisor is manipulating the “chaotic” perspective of the advice-seeker by presenting him to a more regular, albeit more complex perspective on the turbulent situation in which he/she is involved. This idea may be further studied for better understanding advice-giving and has some interesting implications for the future design of automatic advice-giving systems.

ACKNOWLEDGMENTS

The authors thank the anonymous reviewer for his constructive comments and J. Zbilut and C. L. Weber Jr. for their support and advice.

FIGURE 1



A: Mean of REC and DET. B: Mean of LMAX and ENT. Confidence interval = 95%. White bars represent the request for advice (Req.) and the gray bars the advice given (Ad.).

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