

11-1-2021

Why Ovals in Eliciting Intervals?

Joshua Zamora

The University of Texas at El Paso, jazamora6@miners.utep.edu

Vladik Kreinovich

The University of Texas at El Paso, vladik@utep.edu

Follow this and additional works at: https://scholarworks.utep.edu/cs_techrep



Part of the [Computer Sciences Commons](#), and the [Mathematics Commons](#)

Comments:

Technical Report: UTEP-CS-21-90

Recommended Citation

Zamora, Joshua and Kreinovich, Vladik, "Why Ovals in Eliciting Intervals?" (2021). *Departmental Technical Reports (CS)*. 1623.

https://scholarworks.utep.edu/cs_techrep/1623

This Article is brought to you for free and open access by the Computer Science at ScholarWorks@UTEP. It has been accepted for inclusion in Departmental Technical Reports (CS) by an authorized administrator of ScholarWorks@UTEP. For more information, please contact lweber@utep.edu.

Why Ovals in Eliciting Intervals?

Joshua Zamora and Vladik Kreinovich

Abstract To elicit people’s opinions, we usually ask them to mark their degree of satisfaction on a scale – e.g., from 0 to 5 or from 0 to 10. Often, people are unsure about the exact degree: 7 or 8? To cover such situations, it is desirable to elicit not a single value but an interval of possible values. However, it turns out that most people are not comfortable with marking an interval. Empirically, it turned out that the best way to elicit an interval is to ask them to draw an oval whose intersection with the 0-to-10 line is the desired interval. Surprisingly, this seemingly more complex 2-D task is easier for most people than a seemingly simpler 1-D task of drawing an interval. In this paper, we provide a possible explanation of why eliciting an interval-related oval is more efficient than eliciting the interval itself.

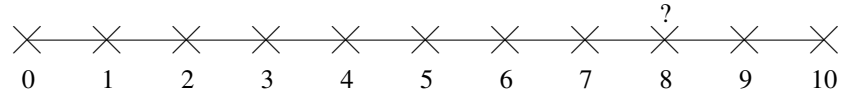
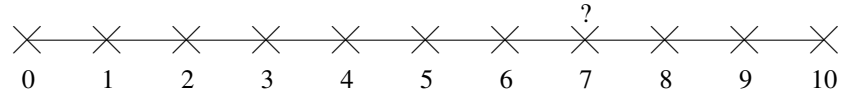
1 Need to elicit intervals

People’s opinion is usually elicited by asking people to mark a point on a scale. This is how, e.g., students evaluate their instructors.

- In some cases, people are absolutely certain about their marks.
- However, in many other cases, they are not so sure. For example, a person may hesitate where to mark a good but not excellent service by 7 or 8 on a 0 to 10 scale.

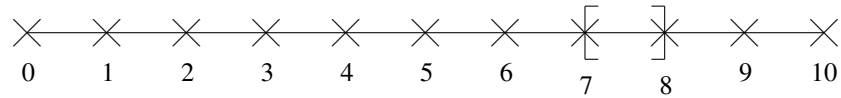
Since the usual scale only allows one mark, the person will put either 7 or 8.

Joshua Zamora and Vladik Kreinovich
Department of Computer Science, University of Texas at El Paso
El Paso, Texas 79968, USA
e-mail: jzamora6@miners.utep.edu, vladik@utep.edu



We could get a more adequate understanding of the people's opinions if we allow the user, in such situations, to explicitly explain that both 7 and 8 – and thus, all the values in between – could be this person's marks.

In other words, we would get a more adequate description of people's opinions if we allow them to describe their opinion by intervals, and not just by the numerical values.

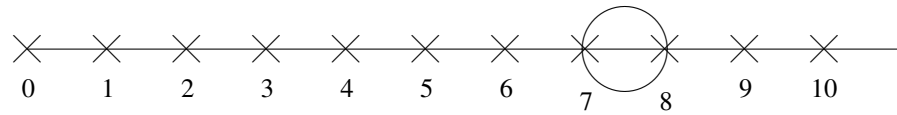


2 Eliciting intervals is not easy

Eliciting intervals would be beneficial for processing people's opinions. However, people are not accustomed to marking intervals. Therefore, they are reluctant to do it.

To make this task easier for users, researchers tried different approaches. Interestingly, a successful approach came when researchers decided to elicit a 2-D figure.

Namely, they elicit an oval whose intersection with the straight line provides the desired interval; see [1].



3 Why: the question and our explanation

Why? A 2-D oval contains more information than the resulting interval. So why is it easier for the users to provide ovals than to directly provide intervals?

Our explanation. Psychologists have found that the perceived complexity of a curve increases with the number of vertices; see, e.g., [2].

- Smooth curves like ovals are the simplest.



- On the other hand, an interval – with 2 vertices – is much more complex.



This explains why it is easier for people to draw an oval than to directly draw an interval.

Acknowledgments

This work was supported in part by the National Science Foundation grants:

- 1623190 (A Model of Change for Preparing a New Generation for Professional Practice in Computer Science), and
- HRD-1834620 and HRD-2034030 (CAHSI Includes).

It was also supported:

- by the AT&T Fellowship in Information Technology, and
- by the program of the development of the Scientific-Educational Mathematical Center of Volga Federal District No. 075-02-2020-1478.

The authors are thankful to all the participants of the 26th Annual UTEP/NMSU Workshop on Mathematics, Computer Science, and Computational Science (El Paso, Texas, November 5, 2021) for valuable discussions.

References

1. Z. Ellerby and C. Wagner, “Do people prefer to give interval-valued or point estimates and why?”, *Proceedings of the 2021 IEEE International Conference on Fuzzy Systems FUZZ-IEEE'2021*, Luxembourg, July 11–14, 2021.
2. J. Wilder, J. Feldman, and M. Singh, “Contour complexity and contour detection”, *Journal of Vision*, 2015, Vol. 15(5), No. 6, pp. 1–16.