A CASE STUDY OF AN ELEMENTARY SCHOOL STUDENT'S INFORMAL INFERENTIAL REASONING IN THE PAPER HELICOPTER EXPERIMENT

Takashi Kawakami
Nishikyushu University, Japan
kawakamita@nisikyu-u.ac.jp

This study aims at illuminate what extent elementary school children can progress the process of informal statistical inference via a simple experiment. This poster reports on a fifth grade student (age 10)'s *Informal Inferential Reasoning* (IIR, Makar et al., 2011) from the view of shutting between *contextual domain* and *statistical domain* (Wild & Pfannkuch, 1999).

In statistics education, IIR has been the focus of research, as it is seen as having a potential to help build fundamental concepts behind formal statistical inference. Several articles (e.g., Makar et al., 2011; Ben-Zvi et al., 2012; English, 2012) have highlighted the development of children's IIR. As pointed out by Maker et al. (2011), authentic and purposeful *context* can scaffold the development of children's IIR. However, recent research has indicated that it is challenging for children to integrate their contextual knowledge and statistical knowledge while making informal statistical inferences (e.g., Pfannkuch, 2011).

In this study, *the paper helicopter experiment* (Fig. 1) was adopted as the authentic and purposeful context in a Japanese fifth-grade class (31 students, age 10–11). It is expected that the simple experiment of measuring the helicopters' flight duration can mediate between contextual domain and statistical domain, as it will give children excellent opportunities to (1) predict distributions of the flight duration, imaging the situation of experiment and to (2) verify the prediction via the experiment. In the class, the students were asked to predict the distributions of the flight duration, organize and represent data via the experiment, verify their predictions, and predict the distributions generated by conducting the improved experiment. The analysis tracked a student's first prediction and second prediction.

The analysis showed that the student could see a distribution as an aggregate, *connecting with context*, through *the shuttling process of informal inference via the experiment* (Fig. 2). In progress of the cycle, the student could predict a distribution by using both statistical ideas about distribution (e.g., *center, shape, density*) and contextual ideas (e.g., *error variability*). This result suggests that the shuttling process of informal inference via an experiment can be a *vehicle* for developing children's reasoning about distribution, relating with context. Children's reasoning processes are complex and diversity, and need to be further investigated for other students.

Fig. 1 Paper helicopter
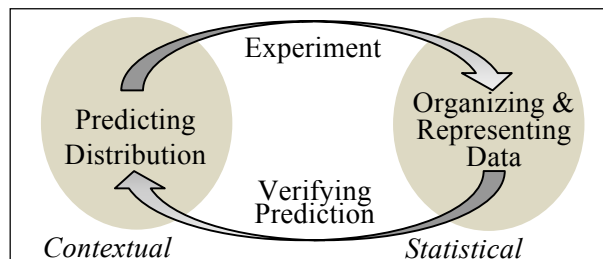
Fig. 2 The shuttling process of informal inference via an experiment

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