Variation in use of East Asian Late Paleolithic weapons: A study of tip cross-sectional area of stemmed points from Korea

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The introduction of blade technology, stemmed points, end scrapers, burins, denticulates, and finer grained materials led to the transition from the Early to Late Paleolithic in Korea. Stemmed points have been considered a representative tool that led this whole set of changes. In this research, we examine the function of stemmed points to understand the role that they played during the technological transition as well as throughout the Late Paleolithic. Our main questions are: What were stemmed points used for? How diverse were their functions? What are the temporal patterns in stemmed point functions? We measured tip cross-sectional areas (TCSA) to discriminate different functional classes of projectile points, for example, poisoned arrowheads or thrusting spear. We analyze TCSA with other variables including raw materials, weight, site and radiocarbon dates. Our results show that the stemmed points mostly functioned as javelins and thrusting spear tips, with smaller numbers as dart tips and arrowheads. TCSA values are depending on size and raw material types. We found different usage of stemmed points in different sites, which could indicate people used stemmed points in different ways depending on the environment. However, some sites show a wide range of TCSA values that represent multi-purpose usage of stemmed points. The temporal pattern of TCSA values is one of little change throughout the Late Paleolithic period. We conclude that stemmed points were mainly used as Javelin but they were multi-functional tools.

# Introduction

The introduction of new technologies led to the transition from the Early to Late Paleolithic in Korea. This transition includes blade technology, stemmed points, end scrapers, burins, denticulates, etc (Bae et al., 2017; Bae, 2017; Lee et al., 2017; Nakazawa and Bae, 2018; Seong and Bae, 2016). In addition to the emergence of the new tools, selective use of raw materials is another notable change. Previously quartzite and vein quartz were the most commonly used for core and flake tools but finer grained materials such as silicified tuff (shale), chert, hornfels, and obsidian became more important to the lithic technology during the Late Paleolithic. People selectively choose more finer materials for the newly introduced tools while they still used coarse materials for the existing tools. (Seong, 2004, 2003). Among them, the appearance of stemmed point has been considered as the earliest sign of the new technology as well as the Late Paleolithic by leading the whole set of changes (Seong, 2008; Seong and Bae, 2016). Because the stemmed points first appeared in Korea in Northeast Asia and they represent a new way of hunting, which is closely associated with mobility, site formation and occupation diversity (Chong, 2021; O’Driscoll and Thompson, 2018; Park and Marwick, 2022). However, regardless of the importance of the stemmed points, there are only a few studies that examine the usage of this tool while researchers often discuss of stemmed points related to their origin and chronology of the Korean Late Paleolithic and relationship with Japan (Chang, 2013; Chong, 2021; Lee and Sano, 2019; Park, 2013).

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