



# Are you looking to teach? Cultural, temporal and dynamic insights into expert teacher gaze



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## ABSTRACT

We know that teachers' gaze patterns affect student learning, that experts and novices differ in their gaze during teaching and that gaze patterns differ by culture in non-educational settings. However, teacher gaze research is limited to Western cultural contexts and largely to laboratory settings. We explored expert and novice teacher gaze in real-world classrooms in two cultural contexts: Hong Kong and the UK. Forty teachers wore eye-tracking glasses during teacher-centred activities. We analysed 'communicative gaze' (gaze during talking) and 'attentional gaze' (gaze during questioning). We compared static (i.e., aggregated) and dynamic (i.e., structural) measures across expertise and cultures. Expert teachers looked longer at students and showed greater gaze efficiency than novices did, during attentional and communicative gaze. Expert teacher gaze was also more strategically consistent. In terms of cultural differences, UK teachers displayed greater attentional efficiency whereas Hong Kong teachers displayed greater efficiency in their communicative gaze. Our research underscores the value of going beyond conventional static analyses for culturally sensitive gaze research.

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## 1. Introduction

An expert has “special skills or knowledge representing mastery of a particular subject through experience and instruction” (Ericsson, 2014, p. 508). Although teachers can display expertise in many different ways, teacher *gaze* is especially pertinent because of its notable role in human learning (Csibra & Gergely, 2009). Expert teaching practice can be identified by comparing experts with novices on measures obtained through process-tracing techniques (Ericsson & Simon, 1980; Ericsson, 2006), such as eye-tracking (Van Gog, Pass & van Merriënboer, 2005) and State Space Grid analysis (Hollenstein, 2013).

Research into expert teacher gaze has already revealed, among experts, a student-centred mentality (Wolff, van den Bogert, Jarodzka, & Boshuizen, 2014), greater efficiency in visual processing (Van den Bogert, Bruggen, Kostons & Jochems, 2014), greater visual flexibility (Wolff, Jarodzka, van dem Bogert & Boshuizen, 2016), and greater consistency in gaze distribution across the classroom (Cortina, Miller, McKenzie, & Epstein, 2015; van den

Bogert et al., 2014) when compared with novices. However, investigations into expert teacher gaze are limited to attentional (i.e., information-seeking) processes, with little examination of the way teachers use gaze for communicative (i.e., information-giving) purposes. Yet, adult gaze is a primary way by which humans are born to learn (Gredebäck, Fikke, & Melinder, 2010) and cognitions underlying gaze can be identified using co-occurring speech (McNeill, 1985). Accordingly, we made use of co-occurring speech (questioning for attentional gaze; lecturing for communicative gaze) and conducted the present study in settings where investigation of communicative gaze was possible: that is, in real-world classrooms.

Moreover, explorations of teacher expertise have been confined to single cultural settings (i.e., the West; cf. Gegenfurtner, Lehtinen, & Säljö, 2011), making most conclusions regarding expertise on gaze ungeneralisable or simply conflated with the cultural aspects of gaze (e.g., Kelly, Mielliet, & Caldara, 2010). We therefore investigated expert teacher gaze also as a function of culture. Expert–novice differences in teacher gaze are purported to collapse in East Asian settings (Yamamoto & Imai-Matsumura, 2013). Yet, by *analysing* teacher gaze in more than one way, we anticipated uncovering expertise differences that have been concealed until now. Where the traditional, static perspective on gaze has failed to

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differentiate experts from novices, the dynamic perspective on teachers' gaze was expected to capture new aspects of expertise differences due to the contribution that process-tracing techniques have the potential to make (Ericsson, 2006).

### 1.1. Teacher expertise

Attaining expertise puts the teacher at great advantage. Experts make better decisions, have greater respect for students and have deeper pedagogical knowledge among other strengths (Berliner, 2004). With teacher expertise comes influence on social processes in the classroom (Brekelmans, Wubbels & Van Tartwijk, 2005); with it also comes student achievement (Hattie, 2003). Classrooms are comparable with “nuclear power plants, medical emergency rooms [and] air traffic control” (Berliner, 2001, p. 478). As such, teachers operate within a high-pressured context, in which the superior memory (Saariluoma, 1991), complex yet accurate manoeuvres (Chassy & Gobet, 2011) and fast decision-making (Haider, Frensch, & Joram, 2005) that characterise expert performance are a real advantage.

Culture changes the way in which teaching occurs. Hofstede (1986) proposed that cultures are either individualistic (i.e., independent) or collectivistic (i.e., inter-dependent). Moreover, individualistic (e.g., Western) classrooms will welcome confrontation, concentrate on each individual's learning processes and individuals speaking up in whole-class discussion. Collectivistic (e.g., East Asian) classrooms, on the other hand, will value whole-class harmony, emphasise learners' progress in performance and students mainly speaking up in smaller-group discussions (Hofstede, 1986). Indeed, teachers are required to cater for different learning preferences, depending on cultural inclinations. East Asian students value learning through abstract concepts and internal reflection, whereas Western students prefer concrete experiences and active experimentation (Joy & Kolb, 2009). In terms of Shulman's (1987) tripartite model of teacher expertise, East Asian teachers demonstrated superior subject knowledge and pedagogical content knowledge whereas Western teachers performed better in their general pedagogical knowledge (Zhou, Peverly, & Xin, 2006). Given the documented East–West contrasts in teachers' values and expertise, we expected to see East–West differences in the way teachers would use their gaze.

### 1.2. Expertise in attentional gaze

In the West, expert teachers distribute their gaze more evenly across the classroom (Cortina et al., 2015). Cortina demonstrated this by collecting teacher gaze data in the classroom using eye-tracking glasses. The gaze data was then analysed using the Gini coefficient (Gini, 1921), a metric for distribution inequality: the higher the Gini index, the greater the inequality. Cortina found novice teachers to yield larger Gini coefficients than expert teachers did. Novice teachers were thus preoccupied with salient classroom events, whereas expert teachers allocated their attention comprehensively throughout the classroom.

Laboratory research in the West has correspondingly shown experts to gaze towards each classroom area more often—and for shorter durations—when compared with novices (van den Bogert et al., 2014). Van den Bogert suggested that expert teachers require less time to process classroom events, which makes them more able to move on from each region at each point. For example, a clapping and waving student—a visually salient classroom area—absorbed the novice's attention for longer than the expert's visual attention. Together, attentional capacities enable experts to distribute their gaze evenly across every classroom area in a way that novices do not.

So far, the expert–novice distinction in teachers' classroom attention is emphatic among Western samples. In East Asia, however, these expert–novice differences are less applicable. Yamamoto and Imai-Matsumura (2013) conducted a study comparable with van den Bogert et al. (2014) in Japan. In this contrasting cultural background, classroom management problems did not lead to expert–novice differences in visual attention. Rather, experts did not apparently notice classroom problems any more than novices did. Yamamoto concluded that East Asian expertise cannot be demonstrated through teacher gaze. While the definition of ‘classroom problems’ in Yamamoto's study is questionable (Wolff et al., 2016), one might also question the way expertise is revealed and how it should be measured in East Asian teacher gaze: an issue that we address in the present paper.

### 1.3. Expertise in communicative gaze

In contrast to attentional gaze that is used for information-seeking, communicative gaze is used for information-giving. Social psychology has documented adult (or teacher) gaze to be part of a system of natural pedagogy whereby teachers' signalling behaviours—such as eye contact—function as part of an innate framework by which infants, even newborns, learn (Csibra & Gergely, 2009). Additionally, Western teacher gaze generally transmits positive messages of support to students (Frymier, 1994; Kerksen-Griep & Witt, 2012). As part of teachers' non-verbal immediacy (i.e., support; Richmond, Gorham, & McCroskey, 1987), eye contact during teacher talk enhances students' perceptions of teacher authority (Richmond, 1990). Non-verbal teacher immediacy through gaze has been consistently associated with positive teacher evaluations (McCroskey, Richmond, Sallinen, Fayer, & Barraclough, 1995). Higher achievement is also predicted by immediacy behaviours such as teacher gaze (Witt, Wheelless, & Allen, 2004). Just as expert teachers use qualitatively different verbal discourse to what novices use (e.g., experts ensure thematic unity throughout teacher talk; Sánchez, Rosales, & Cañedo, 1999), so Western experts send encouraging and supportive signals through gaze in a way that novices do not.

As with gestures (Kita, 2009), culture shapes the social signals contained within gaze. Outside of the education science literature, expressions of the same cognition have been related to different gaze directions across cultural populations. Whereas thinking is shown through upward gaze in the West, it is shown through downward gaze in East Asia (McCarthy, Lee, Itakura, & Muir, 2008). Related is the culturally diverse salience of the eyes during emotional perception. East Asian representations of emotion give importance to the eyes, whereas Western representations of emotion focus on the eyebrows and the mouth (Jack, Caldara, & Schyns, 2012), which suggests that East Asians are more emotionally affected by eye contact. Indeed, Akechi et al. (2013) found East Asian recipients of direct gaze significantly more likely to report negative experiences of arousal. For example, anger was detected from images of direct gaze (i.e., eye contact) significantly more often by East Asian observers than by Western observers. Thus, the effect of eye contact apparently elicits culturally dissimilar reactions. East Asian teachers can therefore be expected to use eye contact differently from Western teachers. East Asian teacher gaze is more likely to convey hostility to their students than it is to convey immediacy, as it would in the West.

### 1.4. Features of expertise in teacher gaze

The present study examines features of expertise within teacher gaze (Sternberg & Horvath, 1995). By taking two different perspectives on teacher gaze (i.e., static and dynamic), we investigated

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