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DEVELOPMENT OF HEAD-TURN PREFERENCE FROM 2 TO 12 WEEKS OF AGE: THE INFLUENCE OF ENVIRONMENTAL CONTEXTS

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CONTEXT

The development of head control in early infancy has been studied for quite a long time (e.g. Turkewitz, 1965 ; Rönqvist, Hopkins, 1998 ; Lima-Alvarez, et al., 2014). Two overarching conclusions from these studies are that prior to 2 months of age, infants' head control is weak, especially when in the supine position, and that the majority of infants prefer turning their head to the right side. In most of these studies, an experimenter momentarily held the infants head at midline before releasing it, or presented a visual stimulus to induce head turn. Very little is known, however, about the development of infants' spontaneous head movements during this early period.

METHOD

Spontaneous head movements were explored in 3 infants (GM, LN and MA) followed weekly from the age of 3 to 12 weeks, until they acquired head control. Infants were observed in 5 conditions: baseline, toys-in-view (preferred head turn side), musical toys out-of-view (non-preferred head turn side), mobile overhead, and mother reading to infant. The toys-in-view condition was not considered for this poster since the head would more likely remain turned in that condition. Each condition lasted 5 min while infants laid in supine on a white padded surface surrounded by two vertical white panels to block distractions from the surroundings. Two synched cameras, placed overhead and to the side, recorded the whole session.

Head movements were coded with respect to the frontal plane at a frequency of 15 Hz with a custom software which provided 2D kinematic data of selected points on the video (VideoAnalyser, Mare, 2010, figure 1). Data were filtered. The infants' nose was the body point of interest selected to describe head turns (figure 2). The rate of change, direction, and duration of head turns were extracted and compared across conditions within each session. Non-parametric Friedman and Durbin-Conover tests were used to compare the head movements between the conditions.

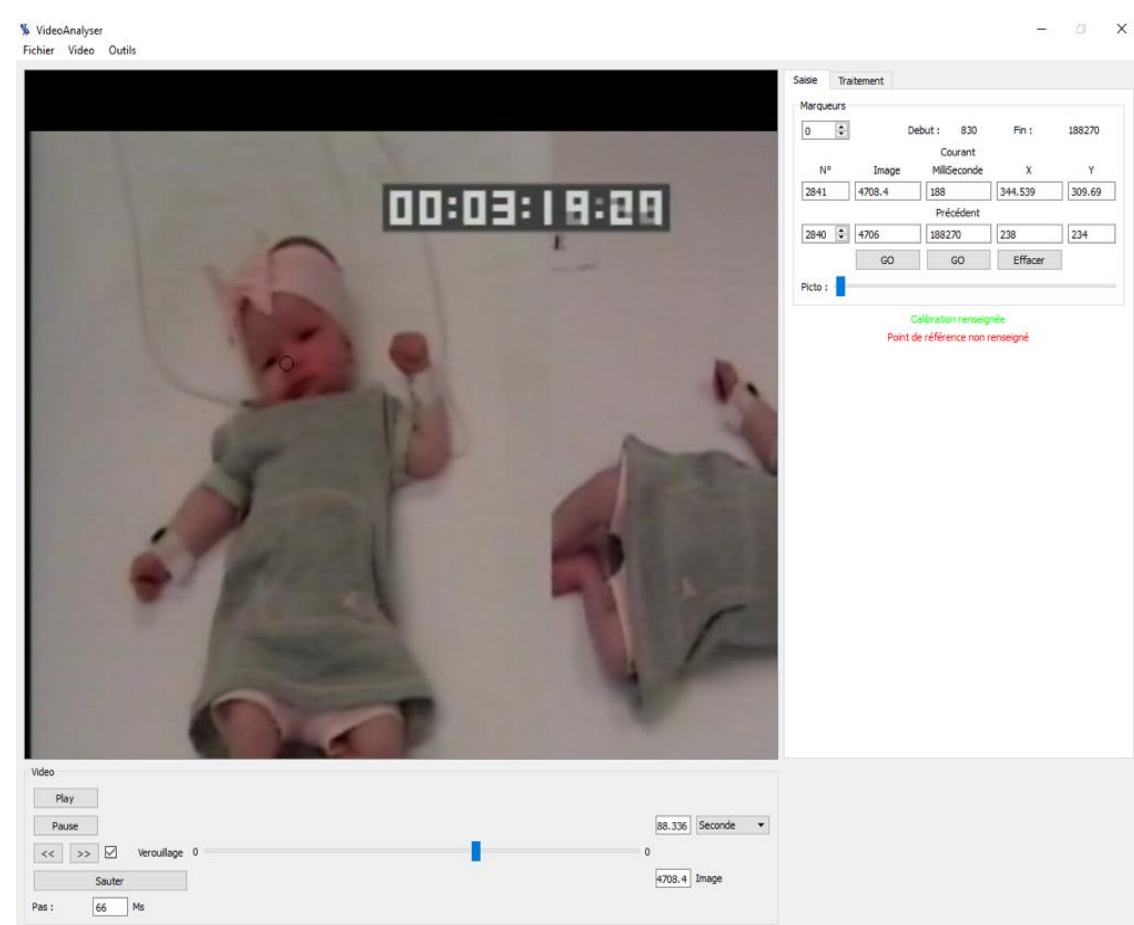


Figure 1: Video Analyser interface. The small circular marker on the nose represents the 2D position (in pixels) that was coded frame by frame for each infant.

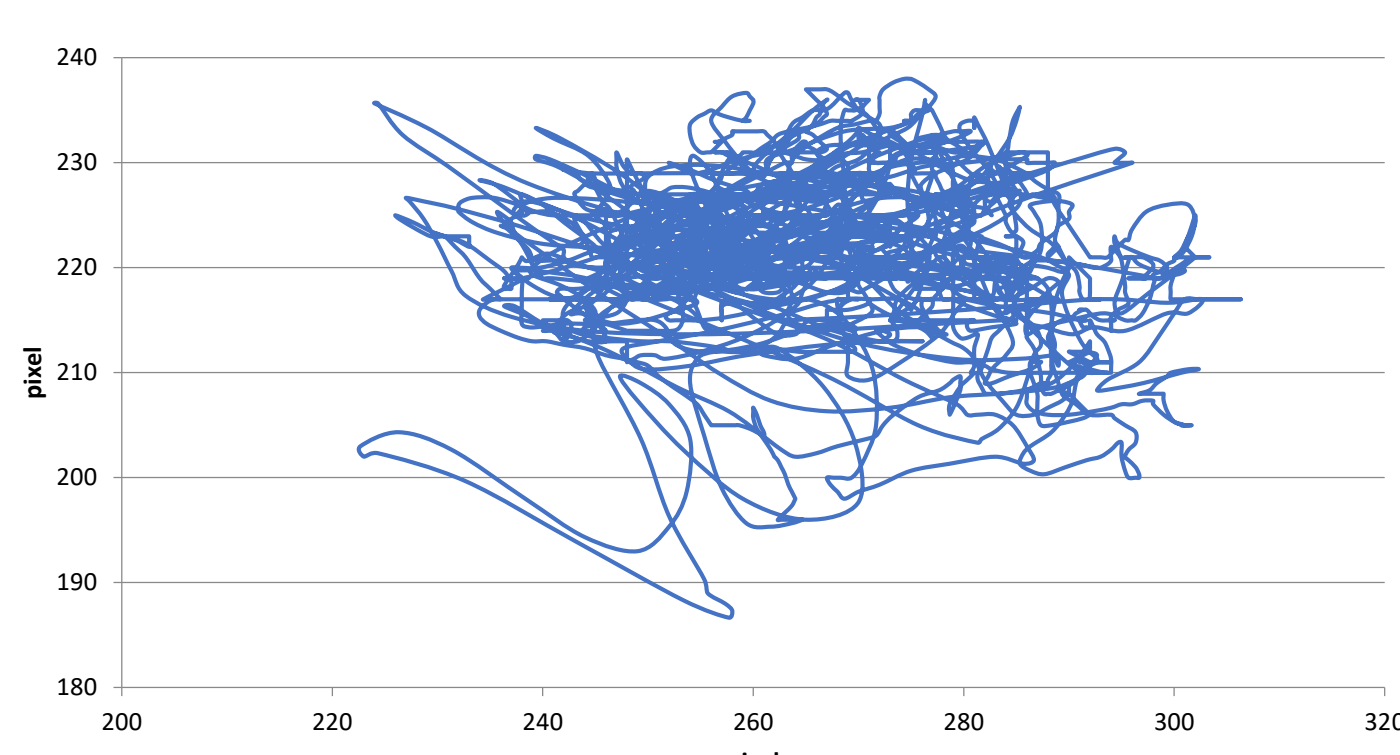


Figure 2: Graphic representation of the infant's nose displacement during 5mn used to describe head turns.

RESULTS

Infants acquired head control at 11 (CG), 13 (LN) and 14 (MA) weeks.

Descriptively, the mean amplitude of spontaneous head displacement was already large at 3 weeks and did not vary before head control was acquired (figure 3). However, the percentage of time the infant was motionless tended to decrease during that time (figure 4).

Figure 3: Amplitude of the infant's nose displacement on the x and y axis according to the time to head control

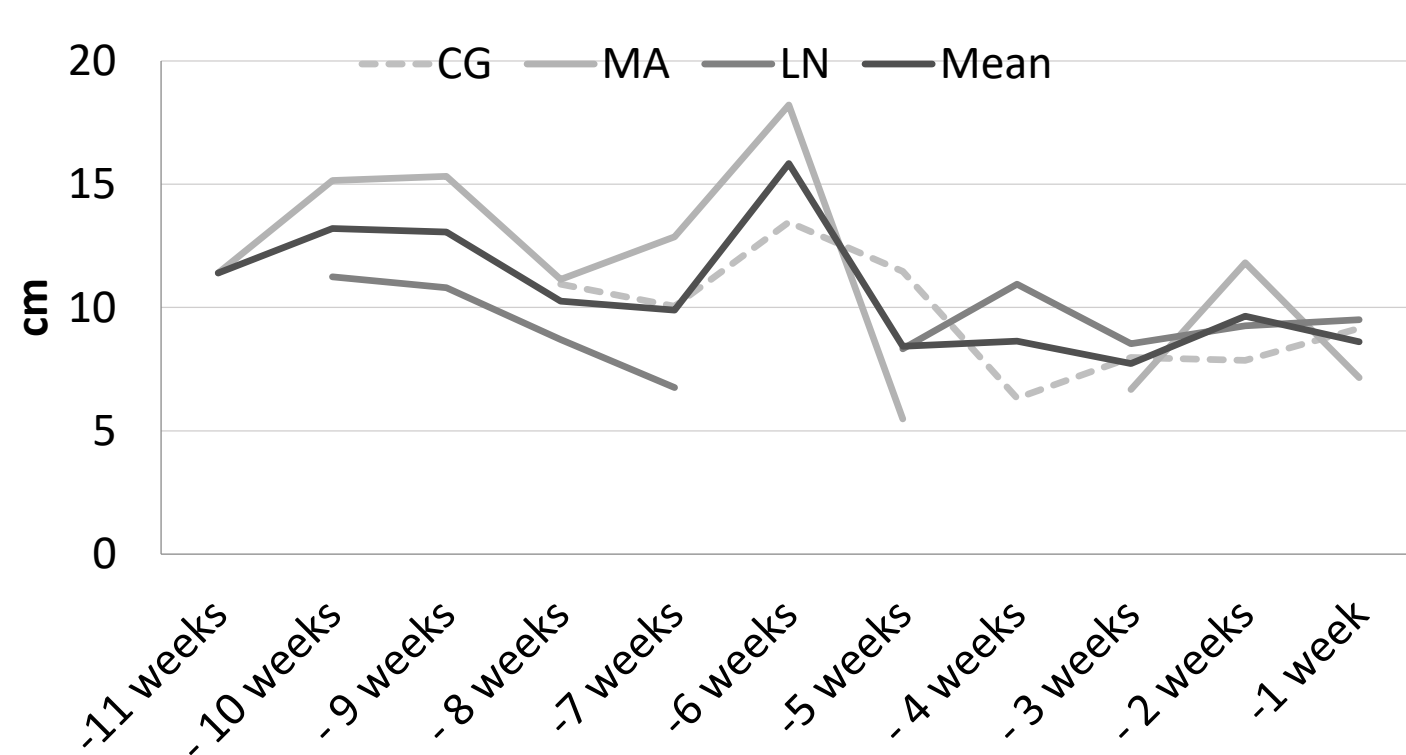
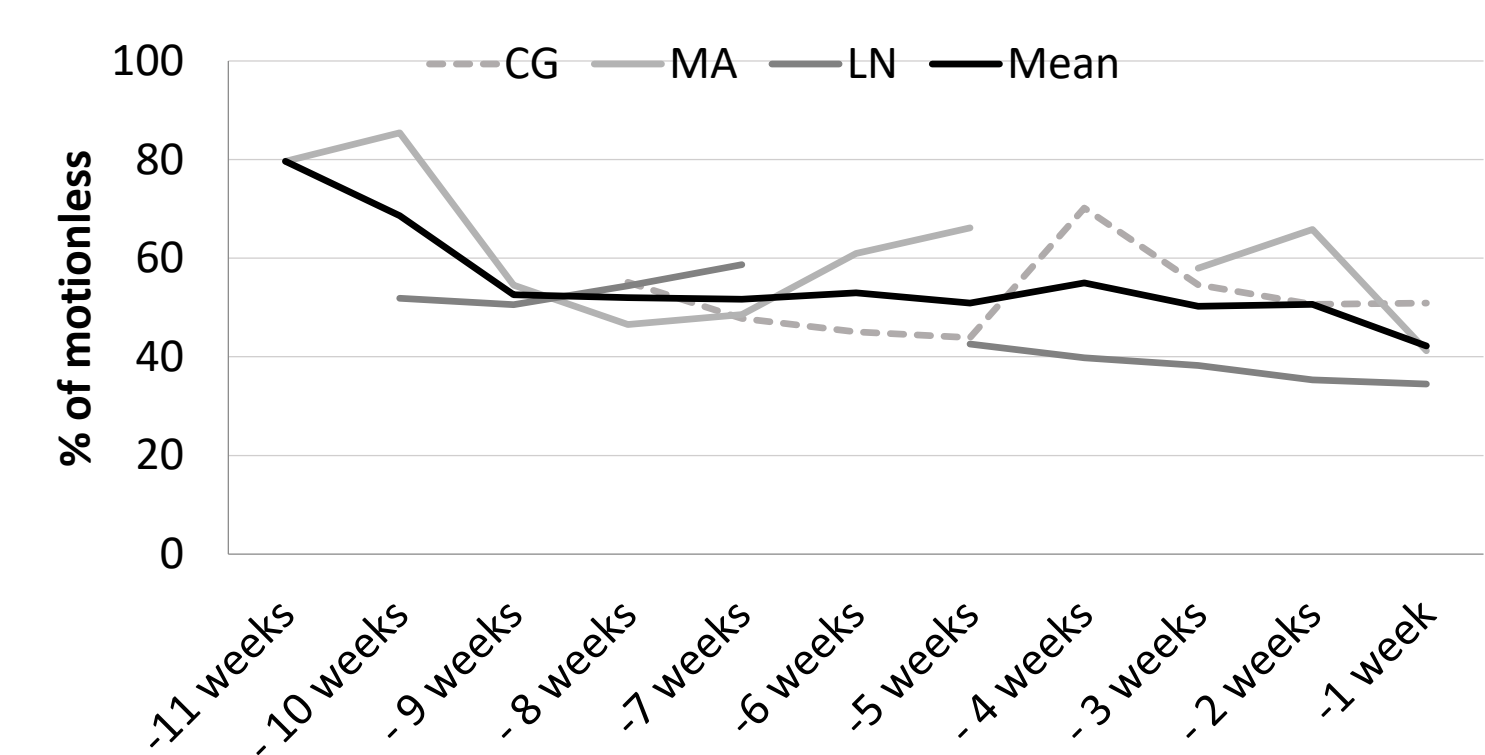
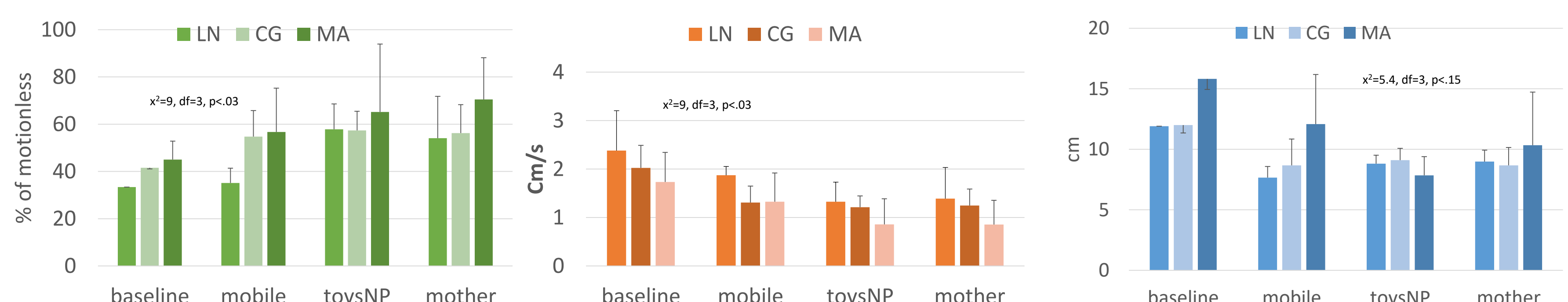


Figure 4: Percentage of the time spent motionless (i.e., velocity < 1cm/s) according to the time to head control.



Infants did not move their head the same depending of the context (figure 5). The difference between the condition was significant, showing that infants were longer motionless in the musical toy (toyNP) and mother conditions as compared to the other conditions. Moreover, their head movements were slower in those conditions. All pairwise comparison showed that each condition differed from each other. However, the amplitude of the infant's nose displacement did not differ significantly according to the condition.

Figure 5: Percentage of the time spent motionless (green), mean velocity (red) and amplitude of the infant's nose displacement according to context.



DISCUSSION

These preliminary results show that infant spontaneous head turns were present well before they acquired head control, however we do not see any developmental trend. Infants were more active in the Baseline and Mobile conditions and more still in the mother condition, possibly due to a motor inhibition mechanism triggered when attention (to the music and mother voice) is engaged (Robertson & Johnston, 2009). This indicates that young babies can move their head differentially depending on the context.

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