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Semeiotica neuropsicologica nelle paralisi cerebrali infantili

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The Role of Inhibitory Control of Reflex Mechanisms in Voluntary Behavior

CONFERENCE PAPER · OCTOBER 2010

Abstract Gaze is often a powerful cue as to where someone's attention is directed and as to what someone intends to do. However, the relationship between fixational eye movements, attention, and intentions is not always straightforward. The phenomenon of covert attention, by which we can direct attention to visual objects that are not being foveated, demonstrates that visual attention can be uncoupled from eye fixations. Observations such as these suggest that eye movements are an example of interaction between reflexive and voluntary behavior. Shifts of selective visual attention are controlled in part by the same frontal areas that control voluntary eye movements. The role of voluntary inhibition of reflex eye movements is clearly shown in the antisaccade task, in which participants learn to look away from a salient stimulus that would trigger a reflex saccade. Voluntary inhibition of reflex behavior in humans appears to be a prerequisite for the emergence of free will.

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Experimental Brain Research

Factors affecting higher-order movement planning: a kinematic analysis of human prehension

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Summary. Past studies of the kinematics of human prehension have shown that varying object size affects the maximum opening of the hand, while varying object distance affects the kinematic profile of the reaching limb. These data contributed to the formulation of a theory that the reaching and grasping components of human prehension reflect the output of two independent, though temporally coupled, motor programs (Jeannerod 1984). In the first experiment of the present study, subjects were required to reach out and grasp objects, with or without on-line, visual feedback. Object size and distance were covaried in a within-subjects design, and it was found that both grip formation and reach kinematics were affected by the manipulation of either variable. These data suggest that the control mechanisms underlying transport of the limb and grip formation are affected by similar task constraints. It was also observed that when visual feedback was unavailable after movement onset subjects showed an exaggerated opening of their hands, although grip size continued to be scaled for object size. The question remained as to whether the larger opening of the hand during no-feedback trials reflected the lack of opportunity to fine-tune the opening of the hand on-line, or the adoption of a strategy designed to increase tolerance for initial programming errors. To address this question, a second experiment was carried out in which we manipulated the predictability of visual feedback by presenting feedback and no-feedback trials in a random order. In contrast to the situation in which feedback and no-feedback trials were presented in separate blocks of trials (Exp. 1), in the randomly-ordered series of trials presented in Exp. 2, subjects always behaved as if they were reaching without vision, even on trials where visual feedback was continuously available. These findings suggest that subjects adopt different strategies on the basis of the predictability of visual feedback, although there is nothing to suggest that this takes place at a conscious, or voluntary, level. The results of both experiments are consistent with the notion of a hierarchically-organized motor control center, responsible for optimizing performance under a variety of conditions through the coordination of different effector systems and the anticipation of operating constraints.

Key words: Limb movements – Visuomotor behaviour – Prehension – Visual Feedback – Human

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Introduction

The act of prehension involves three distinct components: spatial positioning of the arm (the reaching or transport component), anticipatory posturing of the hand (the grip formation component), and object manipulation. In this paper, we will focus primarily on the distinction which is often drawn between the control of the reaching arm and the control of the independent movements of the fingers involved in grip formation. A wealth of anatomical and physiological studies in monkeys have confirmed the predominant role of the crossed, corticospinal projections in fine control of the distal musculature (e.g., Lawrence and Hopkins 1972; Muir 1985; Muir and Lemon 1983; Passingham et al. 1978). The reaching or transport component, in contrast, can be adequately controlled by the hemisphere ipsilateral to the reaching limb (Brinkman and Kuypers 1973; Trevarthen 1965). These findings in monkeys are in agreement with observations from human patients in whom the two cerebral hemispheres have been surgically disconnected (Gazzaniga et al. 1967; Volpe et al. 1982). Furthermore, relatively late myelinization of the corticospinal tract in human infants (see Jeannerod 1988) may underlie the observation that reaching and precision grip have rather different developmental profiles (e.g., Von Hofsten 1979). Other evidence for a dissociation between the neural substrates for the grip and transport components of prehension comes from lesion studies. In monkeys, for example, the control of grip formation is disturbed by damage at the parieto-occipital junction (area 5), while

Y. Paulignan, C. MacKenzie, R. Marteniuk, M. Jeannerod

The coupling of arm and finger movements during prehension

Experimental Brain Research : January 1990, Volume 79, Issue 2, pp 431-435

Anne-Yvonne Jacquet, Rana Esseily, Delphine Rider, Jacqueline Fagard
Handedness for Grasping Objects and Declarative Pointing: A Longitudinal Study
Developmental Psychobiology 2011

ABSTRACT: It is still unclear whether infants become right-handed because of their left-hemisphere specialization for language (through gestural communication for instance), whether they speak predominantly with their left hemisphere because of this hemisphere's superiority in controlling sequential actions which first results in right-handedness, or whether the two lateralization processes develop independently. To tackle this question, we followed 26 human infants from 8 to 20 months to evaluate the temporal relationship between the emergence of hand preference for grasping objects and for declarative pointing (communicative gesture). Our results show that when grasping and pointing are compared in similar conditions, with objects presented in several spatial positions, the tendency to use the right hand is significantly larger for pointing than for grasping, and both hand preferences are loosely correlated. This suggests that, at least at the age studied here, hand preferences for grasping and for declarative pointing develop relatively independently. _ 2011 Wiley Periodicals, Inc. Dev Psychobiol

R. Brooks, A.N. Meltzoff / Journal of Experimental Child Psychology 130 (2015) 67–78

Connecting the dots from infancy to childhood:
A longitudinal study connecting gaze following,
language, and explicit theory of mind

This longitudinal study tested the same children at three time points: infancy (10.5 months of age), toddlerhood (2.5 years of age), and early childhood (4.5 years of age). At 10.5 months, infants were assessed experimentally with a gaze-following paradigm. At 2.5 years, children's language skills were measured using the MacArthur–Bates Communicative Development Inventories. At 4.5 years, children's explicit theory of mind was assessed with a standard test battery. Analyses revealed that infants with higher gaze-following scores at 10.5 months produced significantly more mental-state words at 2.5 years and that children with more mental-state words at 2.5 years were more successful on the theory-of-mind battery at 4.5 years. These predictive longitudinal relationships remained significant after controlling for general language, maternal education, and nonsocial attention. The results illuminate the bridging role that language plays in connecting infants' social cognition to children's later understanding of others' mental states. The obtained specificity in the longitudinal relations informs theories concerning mechanisms of developmental change.

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Developmental Science 8:6 (2005), pp 535–543

RECHELE BROOKS AND ANDREW N. MELTZOFF
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J. Child Lang. 35 (2008), 207–220

RECHELE BROOKS AND ANDREW N. MELTZOFF(2014)
GAZE FOLLOWING: A MECHANISM FOR BUILDING SOCIAL CONNECTIONS BETWEEN INFANTS AND ADULTS
In *Mechanisms of Social Connection(Mikulincher & Shaver eds)*

Tanya Behne*, Ulf Liszkowski, Malinda Carpenter,
and Michael Tomasello

Twelve-month-olds' comprehension and production of pointing

British Journal of Developmental Psychology (2012), 30, 359–375

This study explored whether infants aged 12 months already recognize the communicative function of pointing gestures. Infants participated in a task requiring them to comprehend an adult's informative pointing gesture to the location of a hidden toy. They mostly succeeded in this task, which required them to infer that the adult was attempting to direct their attention to a location for a reason – because she wanted them to know that a toy was hidden there. Many of the infants also reversed roles and produced appropriate pointing gestures for the adult in this same game, and indeed there was a correlation such that comprehenders were for the most part producers. These findings indicate that by 12 months of age infants are beginning to show a bidirectional understanding of communicative pointing.

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Differences in the Nonverbal Requests of Great Apes and Human Infants

Child Development, xxxx 2013

This study investigated how great apes and human infants use imperative pointing to request objects. In a series of three experiments (infants, N = 44; apes, N = 12), subjects were given the opportunity to either point to a desired object from a distance or else to approach closer and request it proximally. The apes always approached close to the object, signaling their request through instrumental actions. In contrast, the infants quite often stayed at a distance, directing the experimenters' attention to the desired object through indexfinger pointing, even when the object was in the open and they could obtain it by themselves. Findings distinguish 12-month-olds' imperative pointing from ontogenetic and phylogenetic earlier forms of ritualized reaching.

Ulf Liszkowskia, Michael Tomasello
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Danielle Matthews, Tanya Behne, Elena Lieven and Michael Tomasello
Origins of the human pointing gesture: a training study
Developmental Science 15:6 (2012), pp 817–829

Tiziana Aureli, Paola Perucchini, Maria Genco
Children's understanding of communicative intentions in the middle of the second year of life
Cognitive Development 24 (2009) 1–12

JOKE J. GEYTENBEEK , LIDWINE B. MOKKINK , DIRK L. KNOL ,
R. JEROEN VERMEULEN & KIM J. OOSTROM

Reliability and Validity of the C-BiLLT: A new Instrument to Assess Comprehension of Spoken Language in young Children with Cerebral Palsy and Complex Communication Needs

AUGMENTATIVE AND ALTERNATIVE COMMUNICATION (BALTIMORE, MD.: 1985) · JUNE 2014

In clinical practice, a variety of diagnostic tests are available to assess a child ’ s comprehension of spoken language. However,none of these tests have been designed specifi cally for use with children who have severe motor impairments and who experience severe diffi culty when using speech to communicate. This article describes the process of investigating the reliability and validity of the Computer-Based Instrument for Low Motor Language Testing (C-BiLLT), which was specifi cally developed to assess spoken Dutch language comprehension in children with cerebral palsy and complex communication needs. The study included 806 children with typical development, and 87 nonspeaking children with cerebral palsy and complex communication needs, and was designed to provide information on the psychometric qualities of the C-BiLLT. The potential utility of the C-BiLLT as a measure of spoken Dutch language comprehension abilities for children with cerebral palsy and complex communication needs is discussed.

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Roberta Michnick Golinkoff, Weiyi Ma, Lulu Song,and Kathy Hirsh-Pasek4
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Assunta Esposito
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2010 - Firenze, Italy: Giunti OS

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Sharon L. Glennen
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Singular Publishing Group, Inc.
San Diego · London

Joseph F. Fagan
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Susan A. Rose, Judith F. Feldman, and Jeffery J. Jankowski

Attention and Recognition Memory in the 1st Year of Life:
A Longitudinal Study of Preterm and Full-Term Infants;

Developmental Psychology 2001, Vol. 37, No. 1, 135-151

Several aspects of visual attention and their implications for recognition memory were examined in a longitudinal sample of full-term and preterm (birth weight < 1,750 g) infants seen at 5, 7, and 12 months of age. At all 3 ages, full-terms had shorter look durations, faster shift rates, less off-task behavior, and higher novelty scores than preterms. Both groups followed similar developmental trajectories, with older infants having shorter looks and more shifts. Infants were consistent in attentional style across problems of the same type, across problems that used different types of stimuli (faces and patterns), and across the familiarization and test phases of this paired-comparison design; there was also modest cross-age stability. Shorter looks and higher shift rates during familiarization were related to better recognition memory, with shift rate adding to prediction independently of either peak or mean look. These findings underscore the importance of attention to infant information processing.

Ai diversi sub test del HAMTEST, la bambina ottiene i seguenti risultati:

	risultati	norme	deviazione standard	prestazione
Simple Reaction (eseguito con la mano dominante)				
Tempo di reazione:	757,5	531,00	103,00	fuori norma
Errori:	0	1.62	1,72	in norma
Simple Reaction (eseguito con la mano non dominante)				
Tempo di reazione	791,47	621,00	94,00	fuori norma
Errori	0	1,22	1,69	in norma
Alert				
Tempo di risposta	638,28	530,00	104,00	in norma
Errori	1,00	5,19	3,70	in norma
Tipo di errore	Type 22: 1	3,1	2,2	
Vigilance				
Errori	25,00	7,93	4,39	fuori norma
Tipo di errore	Tipo 30: 16 Tipo 33: 9	3,03 4,46	2,37 2,36	fuori norma fuori norma
Risposte esatte	34	46,61	2,81	fuori norma

I tempi di reazione "fisiologici" sono contraddistinti da un evidente e significativo rallentamento nell'elaborazione di una risposta motoria per entrambe le mani.
La capacità di controllo e auto-monitoraggio della performance motoria appare sufficiente.
La componente di attenzione sostenuta visiva, rispetto ad un compito monotono, è deficitaria con presenza di una marcata sensibilità ai distrattori (deficit di concentrazione per prove protratte nel tempo).

Al test delle campanelle, rispetto alla precedente valutazione si registra un decremento di punteggio: la prestazione ottenuta dalla bambina, infatti, si colloca al di sotto del 10° percentile, sia per quanto riguarda il parametro della rapidità (individuando nei primi 30" di esposizione ad ognuno dei 4 fogli proposti un totale di 20 stimoli bersaglio (v.n. 49,3 ± 9,8), che per quello dell'accuratezza e dunque il totale degli stimoli individuati (60; v.n. 119,50.3±10,2) (*val. preced.: 25°-50°%ile*).
A differenza del passato, Caterina utilizza una buona strategia di ricerca visiva, in quanto, procede sistematicamente da sinistra a destra, spostandosi dall'alto verso il basso del foglio, tuttavia questo lavoro le richiede una consistente dilatazione dei tempi, con delle penalizzazioni sull'esito finale della prova.

Sostanzialmente stabile la prestazione ottenuta al test CP, una prova di attenzione visiva sostenuta che richiede di ricercare la stringa FZB tra una serie di lettere poste in modo ordinato sul foglio secondo tre differenti livelli di affollamento visivo, la bambina si colloca al 5° %ile rispetto al numero di omissioni compiute e al 10° %ile per quanto riguarda il tempo totale impiegato (*val. preced.: 10° percentile, sia per la velocità per che la correttezza*).

Al test delle Ranette, compito che valuta l'attenzione selettiva, quella mantenuta e l'inibizione motoria, la prestazione di Caterina si colloca al 5° percentile.
La bambina mostra, in particolare, difficoltà nel controllo (autoregolazione motoria) e in più occasioni sobbalza all'ascolto del suono finale (iper-reattività).

8) Letto-scrittura

Nella prova di comprensione del testo relativa alla classe seconda elementare – finale: Caterina risponde correttamente a 8/10 domande, prestazione sufficiente.
Da un'analisi qualitativa della lettura tecnica non si osservano difficoltà.

9) Impressioni cliniche e raccomandazioni

Quadro cognitivo caratterizzato da una buon livello intellettivo (*WPPSI-III: QIV: 108; QIP: 82; QI: 90 - val. novembre 2014*). A livello delle funzioni esecutive, inoltre, si registra un sostanziale mantenimento dei processi di switch attentivo e dei processi di pianificazione visuo-spaziale, attualmente in assenza di comportamenti orientati a violare la regola. Rispetto alla precedente osservazione, tuttavia, si registra un lieve calo prestazionale in ambito delle funzioni attentive, in particolare dei processi di attenzione sostenuta e di attenzione selettiva visiva, sebbene rispetto al passato, a livello qualitativo, ora si apprezza una maggiore capacità della bambina nell'utilizzare strategie di ricerca visiva più funzionali nei compiti di esplorazione. Generale rallentamento nei tempi di risposta, osservabile soprattutto in prove che richiedono un maggior carico attentivo e contestuale difficoltà nei processi di controllo e autoregolazione motoria; si confermano, inoltre, disfunzionali gli aspetti prassico-costruttivi e le abilità visuo-spaziali.

Martina Cambiano

L’INFORMATIZZAZIONE DI PROCEDURE D’ INDAGINE NEUROPSICOLOGICA: CONFRONTO CON I TEST CARTACEI: SECONDO STUDIO PILOTA

Tesi di Specializzazione non pubblicata-2012 – **D .Arisi-** UONPIA Cremona

Giovanni Bilancia, Moreno Marazzi, Davide Filippi
"Neurorehabilitation applied to Specific Learning Disability: Study of a single case"
in "NeuroRehabilitation: an interdisciplinary jornal" issue topic "Assistive Technologies for Cognition/Cognitive Support Technologies"
link: http://www.iospress.nl/journal/neurorehabilitation/