



香港大學教育學院
教育講座系列17:

執行功能與幼兒自我管理

2021年5月15日



新型冠狀病毒疫情對管教幼兒的影響





今日議程

01

簡介
認識執行功能

02

了解幼兒執行功能發展
介紹觀察幼兒執行功能發展的方法

03

協助幼兒發展執行功能
分享協助幼兒發展執行功能的方法



幼稚園教育課程指引

遊戲學習好開始
均衡發展樂成長

課程發展議會編訂
香港特別行政區政府教育局建議
幼稚園、幼稚園暨幼兒中心及設有幼稚園班級的學校採用
二零一七年



Faculty of **Education**
The University of Hong Kong
香港大學教育學院



<https://www.edb.gov.hk/attachment/tc/curriculum-development/major-level-of-edu/preprimary/KGECG-TC-2017.pdf>

活動內容及時間分配例子		
活動內容	約需時間 (分鐘)	
	半日制	全日制
早、午會 / 全班或全組活動 (清潔檢查、談話、生活經驗分享)	15-30	15-30
學習活動和自選區角活動 (例如：建構遊戲、創作遊戲、探究遊戲、 操作遊戲、社會遊戲、語言遊戲)	75-95	110-145
體能活動、音樂活動和藝術活動	45-60	90-105
排洗	20-30	40-60
膳食 (清潔、茶點、午膳)	15-20	60-95
午睡 / 休息	-	80-105
離園整理活動 (整理及分享活動經驗、談話、兒歌)	10-15	25-30

執行功能 Executive Function (EF)

抑制控制能力

Inhibitory Control

當我們在追求一個目標時，
能抑制對無關事物的反應

工作記憶

Working Memory

短期內在我們的頭腦
中容納和處理信息

認知靈活性

Cognitive Flexibility

適當地對變化作反應以
符合新情境的要求



“Just as an air traffic control system at a busy airport manages the arrivals and departures of many aircraft on multiple runways. In the brain, this air traffic control mechanism is called executive function.”


NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD
NATIONAL FORUM ON EARLY CHILDHOOD POLICY AND PROGRAMS

Building the Brain's “Air Traffic Control” System: How Early Experiences Shape the Development of Executive Function

WORKING PAPER 11

Center on the Developing Child  HARVARD UNIVERSITY



 Child Neuropsychology
2003, Vol. 9, No. 4, pp. 267–276

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Concurrent and 2-Year Longitudinal Relations Between Executive Function and the Behavior of 1st and 2nd Grade Children

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ABSTRACT

Concurrent and 2-year longitudinal relations were investigated between two indicators of children's ($n = 60$; mean age = 7 years 11 months) executive function, inhibitory control and sequencing ability, and behavior problem symptomatology. Dependent measures were parent and teacher reported internalizing and externalizing behavior. Hierarchical multiple regression analyses demonstrated few significant concurrent associations between either inhibitory control or sequencing ability, and behavior problem symptoms. In contrast, baseline inhibitory control predicted decreased teacher reported externalizing, and parent reported externalizing and internalizing behavior problems over a 2-year period. Baseline sequencing ability also predicted decreased teacher reported externalizing and parent reported internalizing behavior over this same time period. Results suggest that some aspects of executive function in early elementary grade-school children may be more strongly associated with change in behavior over time than concurrent behavior. Implications of these findings for the prevention of behavior problems are discussed.

The developmental trajectories in children's social, emotional, and behavioral spheres are embedded in ecological models that include important factors at the levels of individuals, families, schools, and communities. Children's cognitive ability is one individual-level factor that has been linked to these aspects of development. The frontal and pre-frontal cortex is a specific neural region implicated in governing the cognitive skills linked to behavioral development. This region is thought to be the seat of the brain's self-control processes, often referred to as executive function (Pennington & Ozonoff, 1996; Welsh, Pennington, & Groisser, 1991).

Executive function generally refers to the psychological processes that are involved in the conscious control of action and thought. Conscious

control of action and thought is required whenever a person is presented with novel information or must execute a new response that is in conflict with automatized response tendencies. Inhibitory control, an intention to inhibit action or thought, or defer it to a later more appropriate time, and sequencing ability, a plan of action sequences, are two executive functions that have recently been implicated in children's behavioral development (Welsh & Pennington, 1988).

The aim of the current study was to supplement current literature investigating the link between inhibitory control and sequencing ability, and the behavioral development of children in the early school-aged years. Both concurrent and 2-year longitudinal relationships were investigated between these two aspects of executive function, and

“Baseline inhibitory control predicted decreased teacher reported externalizing, and parent reported externalizing and internalizing behavior problems over a 2-year period.”

Riggs, N. R., Blair, C. B., & Greenberg, M. T. (2003). Concurrent and 2-year longitudinal relations between executive function and the behavior of 1st and 2nd grade children. *Child Neuropsychology*, 9(4), 267-276.



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Developmental Psychology

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Testing Longitudinal Associations Between Executive Function and Academic Achievement

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Children with higher levels of executive function (EF) skills consistently demonstrate higher levels of academic achievement. Despite the consistency of these associations, fundamental questions remain about whether efforts to improve an individual child's EF skills result in corresponding improvements in his or her academic performance. In the absence of experimental evidence, developmentalists have used repeated measures designs to test the nature, magnitude, and direction of the associations between EF skills and academic achievement. In contrast to previous studies, this study described how between- and within-person associations between EF and achievement address different questions. Using data from a subsample of participants ($N = 6,040$) from the Early Childhood Longitudinal Study–Kindergarten, 2010–2011 (ECLS-K:2011) cohort, we estimated a series of latent growth curve models with structured residuals to test the between and within-person associations between 2 dimensions of EF (working memory, cognitive flexibility) and 2 domains of academic achievement (math, reading). Whereas between-person associations between EF and achievement were large ($\eta^2 = .55-.91$), the within-person associations were small ($\beta_s = -.10-.25$). Within-person effects of earlier reading achievement on later EF skills was the most consistent finding. Results were unchanged when analyses were repeated using the subset of children who were eligible for free and reduced-price lunch, a proxy for low socioeconomic households. Results are discussed with respect to interest in improving EF skills as a means for facilitating school outcomes.

Keywords: executive function, academic skills, early elementary education

Supplemental materials: <http://dx.doi.org/10.1037/dev0000664.supp>

Executive functions (EF) are a set of cognitive skills—including inhibitory control, working memory, and cognitive flexibility—that facilitate planning and problem solving, including learning endeavors (Diamond, 2013). Individual differences in EF skills have been consistently associated with children's academic achievement and learning-related outcomes (Best, Miller, & Naglieri, 2011; Ursache, Blair, & Raver, 2012; Willoughby, Magnus, Vernon-Feagans, Blair, & the Family Life Project Investigators, 2017). This has led to widespread interest in understanding whether EF skills contribute to the achievement gap between children from different socioeconomic backgrounds (Blair & Diamond, 2008; Blair & Raver, 2012; Crook & Evans, 2014; Hackman, Farah, & Meaney, 2010; Heckman, 2006; Shonkoff, 2011). This is inherently a within-person question that has significance for educators and policymakers alike. Unfortunately, relatively

few studies have utilized research designs and statistical methods that directly inform within-person inferences.

Two recent meta-analytic studies reported moderate-sized bivariate associations between EF and academic achievement (Allan, Hume, Allan, Farrington, & Lonigan, 2014; Jacob & Parkinson, 2015). Allan, Hume, Allan, Farrington, and Lonigan (2014) focused on measures of inhibitory control exclusively among young (preschool and kindergarten) children and reported mean effect sizes of $r_s = .25$ and $.34$ for literacy and math, respectively. In general, the associations were stronger when inhibitory control was measured using performance-based tasks versus parent or teacher ratings. Jacob and Parkinson (2015) focused exclusively on performance-based tasks of multiple aspects of EF (not just inhibitory control) in students of varying ages (3–18 years). They reported mean effect sizes of $r = .30$ and $.31$ for reading and math achievement, respectively. The effect sizes were similar for all of the age ranges that were considered, including between preschool (i.e., 3- to 5-year-olds) and elementary school (i.e., 6- to 11-year-olds) samples. Moreover, although EF skills are often emphasized as contributing to school readiness, more studies were identified that examined the association between EF skills and academic achievement among elementary than preschool-aged samples. Notably, these effect sizes represented the overall association between EF skills and academic achievement that included both between- and within-person sources of variation. Therefore, although meta-

“Children who start school with higher levels of EF skills also start with higher levels of academic achievement.”

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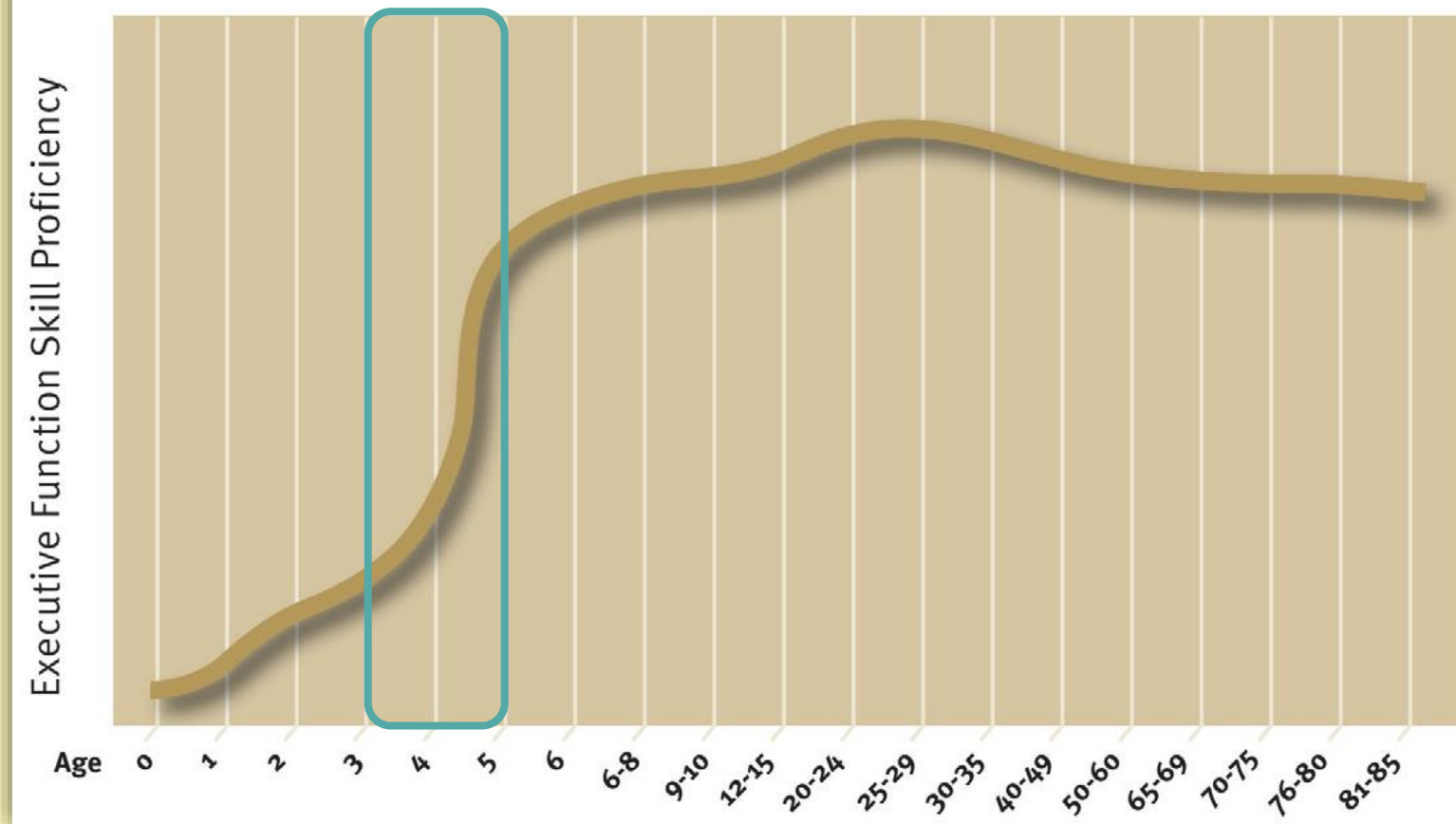
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Willoughby, M. T., Wylie, A. C., & Little, M. H. (2019). Testing longitudinal associations between executive function and academic achievement. *Developmental Psychology*, 55(4), 767.

幼兒執行功能發展



Executive Function Skills Build Into the Early Adult Years



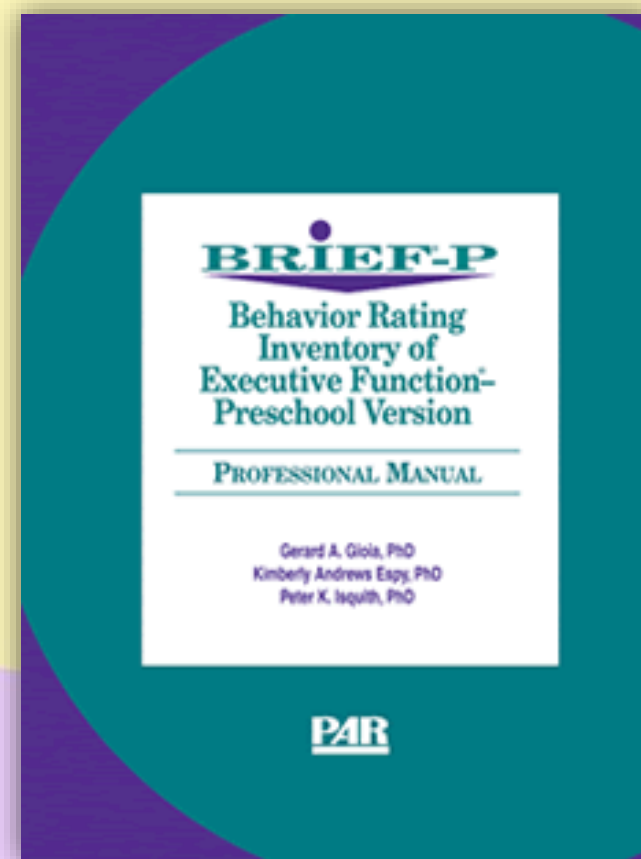
3歲至5歲是
執行功能急促成長
的一個重要關口



其後平穩持續發
展至成年期早期

了解幼兒執行功能發展

- Behavior Rating Inventory of Executive Function®– Preschool Version (BRIEF-P)
- 為2-5歲兒童制定的標準評級量表
- 以了解與執行功能特定領域相關的日常行為
- 父母或其他照顧者可觀察孩子的日常行為



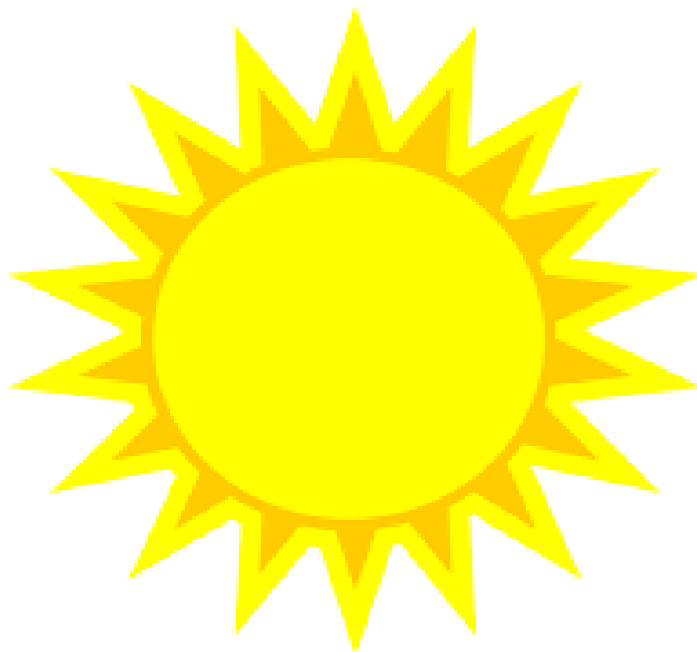


觀察抑制控制能力

1. 相比起同齡的幼兒，子女是否較難控制自己的言行舉止？
2. 子女會否不顧一切地玩而導致受傷？
3. 說話時，子女是否有困難維持話題？
4. 子女是否經常無法完成任務？

Day-Night Stroop

夜晚



朝早





觀察工作記憶力

1. 當有多過一項任務時，子女會否只記得第一項或最後一項？
2. 子女是否有困難完成牽涉多於一個步驟的任務？
3. 子女會否在進行活動時忘記自己在做什麼？
4. 子女是否無法完成對事件、人物或故事的描述？



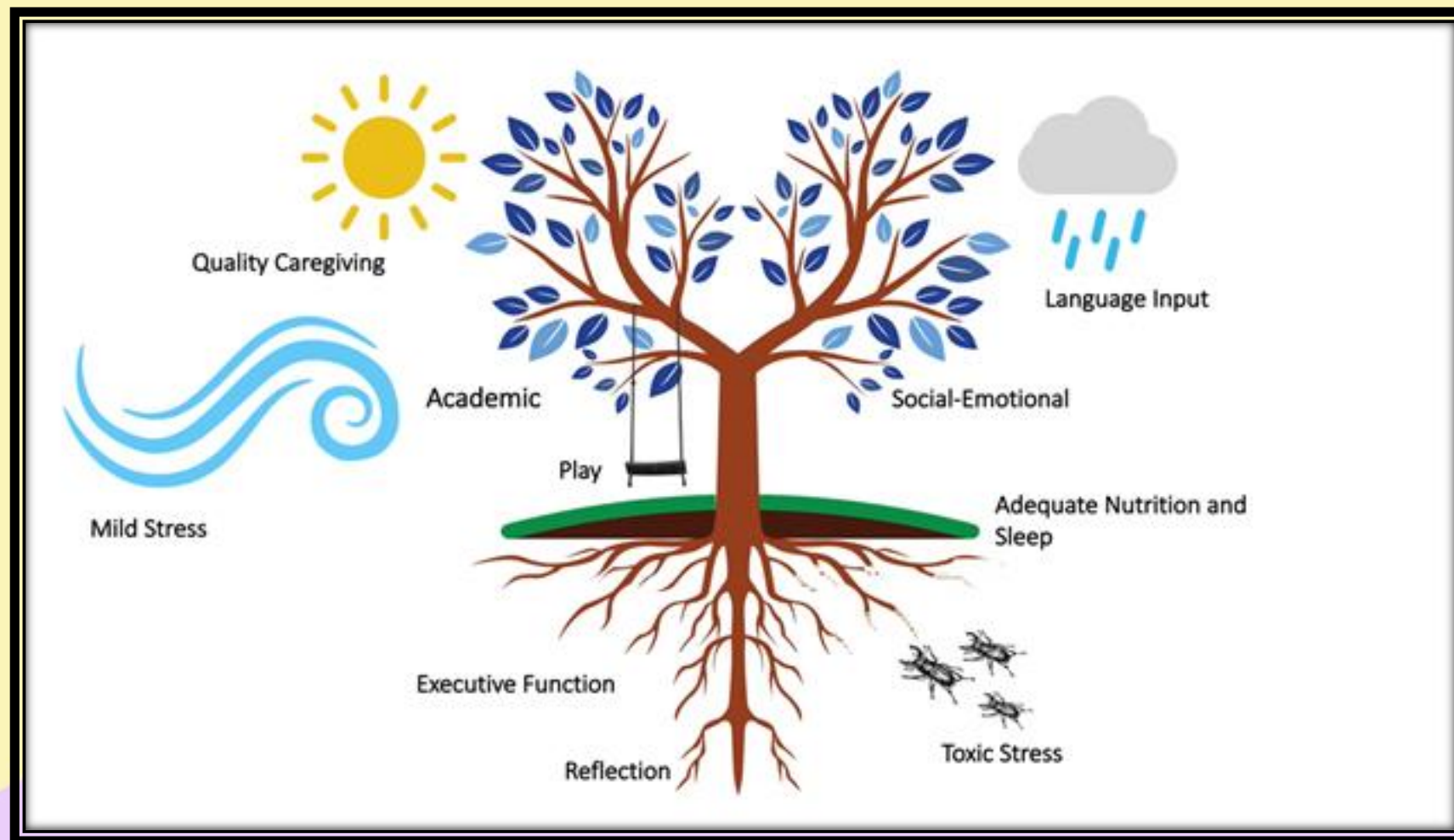
觀察認知靈活性

1. 子女會否需要很長時間才能在新的地方或情況下感到自在？
2. 子女是否難以適應新認識的人？
3. 子女會否拒絕接受對常規、食物或地方等的轉變？
4. 子女遇到難題時，會否無法思考解決問題或完成活動的另一種方式？

Sorting Game with Changing Rules



發展幼兒執行功能



- 關係
- 環境
- 活動

Cognitive-Behaviour Modification Self-Instruction Model

	任務的執行	任務的說明
1. Cognitive modelling 認知示範	成人示範執行任務， 為幼兒建立榜樣	成人講述步驟
2. Overt, external guidance 外顯式、外界的指導	幼兒執行任務	成人講述步驟
3. Overt self-guidance 外顯式自我指導	幼兒執行任務	幼兒發聲重複步驟
4. Faded, overt self-guidance 淡出的外顯式自我指導	幼兒執行任務	幼兒輕聲說出步驟
5. Covert self-instruction 隱藏式自我指導	幼兒執行任務	幼兒無聲地想著步驟

自我指導的句子 Self-Guiding Statements

1. 問題定義和策略選擇 Problem Definition and Strategy Selection

例子：「我應該要做什麼？」

2. 策略的執行 Strategy Implementation

例子：「我在按我說的去做嗎？」

3. 錯誤管理 Error Management

例子：「如果我犯下錯誤該怎樣修正？」

4. 自我強化/自我檢討 Self-reinforcement / Self-checking

例子：「我做得怎樣？」或「讓我先檢查一下。」

實際例子 1 – 功課篇



2

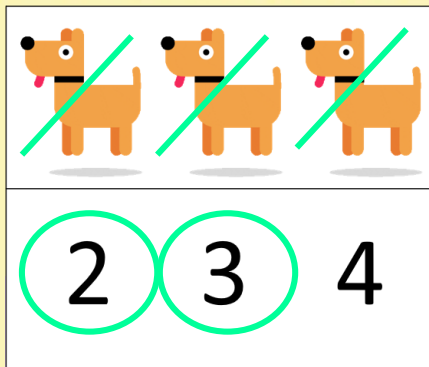
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功課篇 – 實行步驟

	任務的執行	任務的說明
1. Cognitive modelling 認知示範	成人示範答題， 為幼兒建立榜樣	成人講述步驟
2. Overt, external guidance 外顯式、外界的指導	幼兒答題	成人講述步驟
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5. Covert self-instruction 隱藏式自我指導	幼兒答題	幼兒無聲地想著步驟

功課篇 – 指導語



「我必須記住要小心找出正確答案。我要小心數數這裡有多少隻狗。我可以每數一隻狗便刪掉一隻。1...2...3... 最後數字是3，所以總共有三隻狗 [問題定義和策略選擇]。好，到目前為止我做得很好，有小心地數 [策略的執行]。接下來要把正確答案圈上。這個數字好像是三，讓我圈上。現在看看其他的數字。噢，這個數字才是三，剛才錯了。不要緊，只需要把圈小心擦掉 [錯誤管理]。我想應該是這個數字，但讓我先看看最後那數字，確保無錯。最後那數字是四，所以我應該圈中間個3字。做得很好，我有小心地答題 [自我強化/自我檢討]。」

實際例子 2 – 活動篇

- 遊戲：魔鏡魔鏡
- 玩法：我們找到了面魔鏡。鏡子說：「你現在必須做我告訴你的一切，例如：摸頭、拍手、揮揮手，你便要跟著做。但是如果我說了咒語 – 嗎喱空，你則必須調轉次序執行動作，即先揮揮手、然後拍手、最後摸頭。」

活動篇 – 實行步驟

	任務的執行	任務的說明
1. Cognitive modelling 認知示範	成人示範玩遊戲， 為幼兒建立榜樣	成人講述步驟
2. Overt, external guidance 外顯式、外界的指導	幼兒玩遊戲	成人講述步驟
3. Overt self-guidance 外顯式自我指導	幼兒玩遊戲	幼兒發聲重複步驟
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5. Covert self-instruction 隱藏式自我指導	幼兒玩遊戲	幼兒無聲地想著步驟

活動篇 – 指導語

「我必須用心記住動作及留心有沒有咒語，不要衝動作反應。這次有咒語，所以我要調轉次序執行動作。我可以先跟隨重複指令

【問題定義和策略選擇】。摸頭... 拍手... 揮揮手...好，到目前為止我做得很好，有小心記住動作**【策略的執行】**。然後，因為有咒語，所以我要將次序調轉。我可以一邊提示自己，一邊執行動作

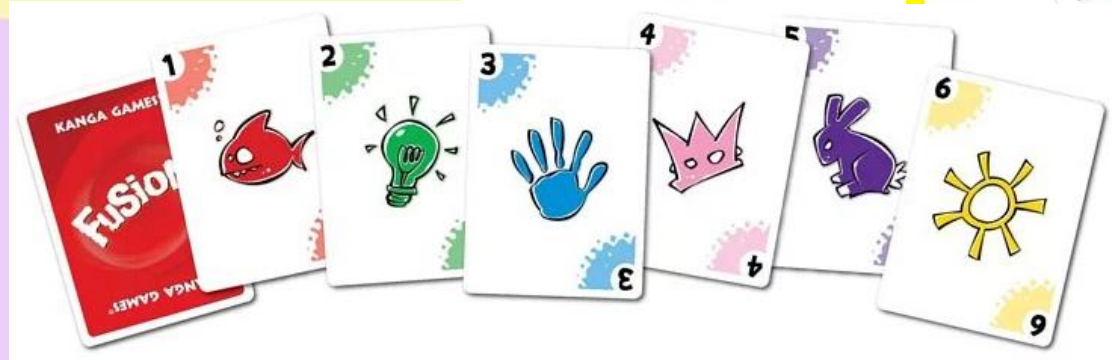
【問題定義和策略選擇】。揮揮手... 摸頭.....噢，錯了，揮揮手後應該是拍手，才到摸頭。不要緊，我從頭來過**【錯誤管理】**。揮揮手... 拍手... 摸頭。做得很好，我有用心記住動作及沒有衝動作

反應

【自我強化/自我檢討】。

其他活動例子

- 講故事
- 角色扮演
- 親子遊戲
- 桌遊
- 家務遊戲
- 烹調活動





Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence





賽馬會「玩學相長」計劃 Jockey Club "Play n Gain" Project

主辦機構：



香港大學教育學院
融合與特殊教育研究發展中心
Centre for Advancement
in Inclusive and Special Education
Faculty of Education, The University of Hong Kong

捐助機構：



香港賽馬會慈善信託基金
The Hong Kong Jockey Club Charities Trust

中文

English

首頁

關於我們

互動遊戲寶庫

伙伴學校

社區活動

資源

新聞中心

聯絡我們



賽馬會「玩學相長」計劃

由香港賽馬會慈善信託基金捐助、香港大學教育學院 融合與特殊教育研究發展中心推行的賽馬會「玩學相長」計劃，是源自於一項已有效實施了十多年的社交能力影響研究計劃的社交情緒學習項目。

賽馬會「玩學相長」計劃旨在支援家長和教師成為變革推動者，透過在不同環境中進行的面對面互動遊戲，促進孩子的社交技能和情感發展。項目已在幼稚園進行，並推廣至家庭和社區。

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精選親子遊戲 ★

眼明手快

如何才算是「好遊戲」呢？
我玩的又是「好遊戲」嗎？



<https://www.jcplayngain.edu.hku.hk/>

BUILDING CHILDREN'S EXECUTIVE FUNCTION SKILLS BENEFITS EVERYONE.

