

  
LEIDEN UNIVERSITY MEDICAL CENTER

**Thought process effects in diagnostic decisions**

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 **Diagnostic Error in Medicine 2010**  
OCTOBER 25-27, 2010 | TORONTO, CANADA  
[www.smdm.org/diagnostic\\_errors.shtml](http://www.smdm.org/diagnostic_errors.shtml) **October 25, 2010**



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**Thought process effects in diagnostic decisions**

*In collaboration with:*  
**Cilia Witteman, Leontien de Kwaadsteniet, John van den Bercken,  
Rob Holland & Ap Dijksterhuis**  
*Radboud University Nijmegen, The Netherlands*





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 **Importance of Diagnosis**

Diagnosis: basis for treatment choices  
→ Patient well-being  
→ Costs of health care

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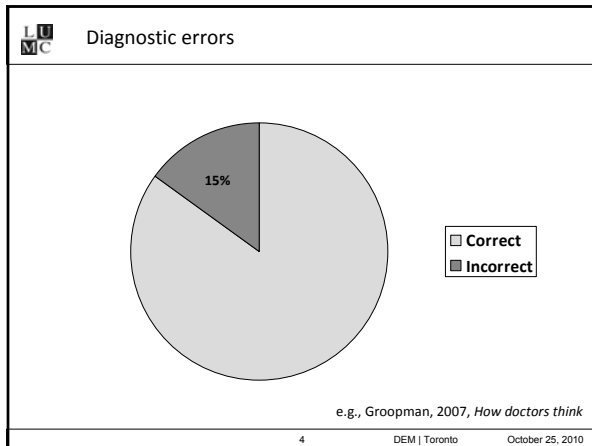
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LU MC Thought process effects in clinical decision making: Introduction

**Current Focus: Diagnosis of psychological disorders**

- **DSM:** Diagnostic and Statistical Manual of Mental Disorders (APA), used as the standard in most countries
- Psycho-diagnosis: difficult, error prone

→Thought process effects?

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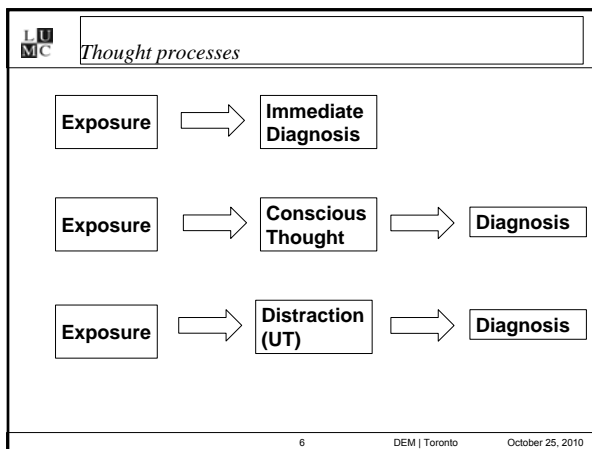
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**LU**  
**MC** *Thought processes: Thinking too much*

- Thinking too much  
(e.g., Wilson & Schooler, 1991; Wilson et al., 1993; Wilson, 2002)

Analyzing Reasons → Reduced  
• preference & decision quality  
• post-choice satisfaction

Why?

- focus attention on nonoptimal criteria
- base their subsequent choices on these criteria

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**LU**  
**MC** *Thought processes: Think different*

- Unconscious Thought: Information processing while being distracted  
(e.g., Dijksterhuis, 2004; Dijksterhuis et al., 2006)

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**LU**  
**MC** *Unconscious Thought Effect*  
(e.g., Dijksterhuis, 2004, *JSPS*; Dijksterhuis et al., 2006, *Science*)

The bar chart displays the 'Quality of Judgment/Choice' on the y-axis (ranging from 0 to 4) against three processing types on the x-axis: Conscious, Direct, and Unconscious. The 'Conscious' bar is at approximately 1.5, 'Direct' is at approximately 1.4, and 'Unconscious' is at approximately 2.8.

Processing Type	Quality of Judgment/Choice
Conscious	~1.5
Direct	~1.4
Unconscious	~2.8

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**LU**  
**MC** *Thought processes: Think different*

- Unconscious Thought: Information processing while being distracted  
(e.g., Dijksterhuis, 2004; Dijksterhuis et al., 2006)
  - Processing capacity
  - Assigning weights to attributes

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**LU**  
**MC** *Thought processes: Think different*

- Unconscious Thought: Information processing while being distracted  
(e.g., Dijksterhuis, 2004; Dijksterhuis et al., 2006)
  - Processing capacity
  - Assigning weights to attributes
- Currently hotly debated  
(e.g., Gonzalez-Vallejo et al., 2008; Lassiter et al., 2008; Strick et al., 2010)
  - Moderators
  - Contexts

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**LU**  
**MC** *Everyday Decisions versus Diagnosis*



cf. e.g., Bekker, 2006; Mamede et al., 2010

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**LU**  
**MC** *Overview of Studies*

- Study 1 (Novices):
  - Conscious versus Unconscious Thought
- Study 2:
  - Novices versus Experienced Diagnosticians
  - Conscious versus Unconscious versus Direct
  - Difficulty Level of Diagnostic Task

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**LU**  
**MC** *Unconscious Thought Effect in Diagnostic Decision Making (Study 1)*

Conscious vs. Unconscious Thought in DDM:

- Diagnosis:
  - large amount of information
  - Assigning appropriate weights to attributes

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**LU**  
**MC** *Unconscious Thought Effect in Diagnostic Decision Making (Study 1)*

Conscious vs. Unconscious Thought in DDM:

- Diagnosis:
  - large amount of information
  - Assigning appropriate weights to attributes
- More accurate classifications after unconscious thought?

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Method Study 1

- 80 participants (advanced-level students in Clinical Psychology)
  
- **Design:** Conscious vs. Unconscious Thought
  
- **Procedure:**
  - Two co morbid case descriptions DSM-Case book
  - Conscious (4 minutes) vs. Unconscious Thought (word search puzzle)
  - Classifications (0-4)

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LUMC
Case description: Example "Skinny Tim"

Eight-year old Tim has been referred by a pediatrician who asked for an emergency check because of serious loss of weight over the past year with no apparent somatic cause. Tim is excessively concerned about his weight and weighs himself every day. He complains about being too fat and about the fact that he does not lose weight when he starts eating less. He lost 4.5 kilos last year and still thinks he is too fat, while it is clear that he is suffering from underweight. Desperately, his parents got rid of all the weighing scales at home; in reaction to this Tim is now making lists daily, registering all the calories he consumes. He puts a lot of time into this, checking whether he did not make any mistakes again and again.

Moreover, Tim is described as being obsessed by clarity and conscientiousness. He does not have any friends at the moment; he does not want to visit their homes because he thinks those houses are "dirty"; he easily gets mad when another child touches him. He always checks whether or not he has done things the "right" way. This makes him very excited and anxious. Every day, he has to get up at least two hours before he has to go to school in order to be ready in time. Lately, he got up at 1.30 AM to prepare for school.

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Method: CT vs. UT (distraction)



**WOORDZOEKER**

AMBERLIEB	GRIMPLOT	ILNOCHTIG
ANTRAMER	GRIPHOUS	ISLIM
APPELZEN	JANFARMER	SCHTTEREN
ARZNEIWEIS	KLEPTMAN	SCHTTERE
ARCOFOLIN	KLANK	TAGE
ARUCUSCH	KODERT	TEG
CHALEN	FRAMAGENK	TOERNOCH
COMBESSEUR	LARELWIT	TREZEN
DAMETRO	LIELOK	WIKERWIK
DREIL	LUCCARABEL	WIKERWIK
ENKOWARE	PLUGER	WIKERWIK
ERENET	POFFTUD	WIKERWIK
FRANTER	ROESSTAT	WIKERWIK
FRELOIN	SECRETARIE	ZIJNDE
GRANET	SLANK	ZIJNDE

S	U	I	K	K	P	Z	E	K	B	N	Z	O	R	O	D	P
L	A	N	D	O	W	E	K	T	P	L	O	G	E	R	O	
I	E	A	O	O	R	T	K	N	A	L	O	O	I	S	E	O
V	O	F	C	N	L	K	P	A	L	G	C	A	E	O	A	T
O	C	Z	A	B	E	T	N	S	T	A	O	W	Y	N	E	A
C	L	E	T	O	T	T	O	R	M	V	A	T	M	T	U	
T	O	T	F	W	P	O	R	J	C	F	O	C	K	L	A	N
T	F	M	A	T	E	L	Z	O	R	O	B	P	T	N	A	M
B	A	C	H	L	L	E	A	R	B	T	P	Z	P	U		
Z	A	K	C	M	C	M	A	R	O	A	O	F	E	L	L	S
K	O	K	H	A	P	S	A	T	P	B	L	R	I	L	E	A
T	T	C	O	M	A	N	D	O	U	A	N	M	O	E	K	
V	H	K	A	N	P	E	N	O	H	T	K	A	N			

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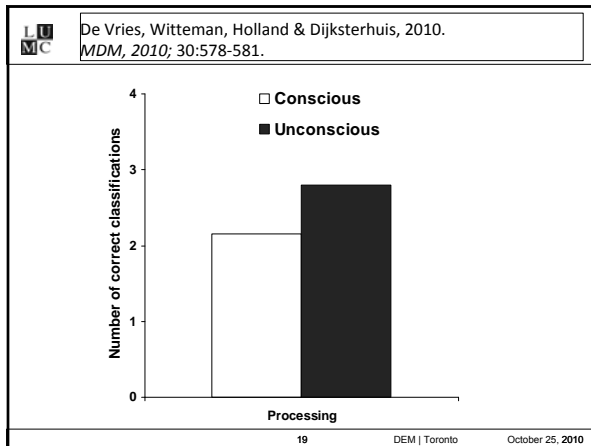
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LU MC **Study 2**

- **Novices and Experienced Clinicians** (cf. Mamede et al., 2010)
- **Unconscious Thought (UT), Conscious Thought (CT) and Direct**
- **Difficulty of Task**

**Hypothesis:**

- **Experts:** well-developed intuition through experience  
→ **Direct & UT > CT for familiar classifications**
- **Novices:** few experiences, but recently learned explicit rules  
→ **CT > Direct & UT for familiar classifications**
- **Unfamiliar, high difficulty:** no response available, further processing (CT or UT) needed; UT > CT (cf. Study 1)

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LU MC **Method Study 2**

- 72 participants (36 novices & 36 experienced diagnosticians)
- **Design:** Conscious vs. Unconscious vs. Direct
- **Procedure:**
  - Two co morbid case descriptions
  - Conscious vs. Unconscious vs. Direct
  - Classifications (0-1)

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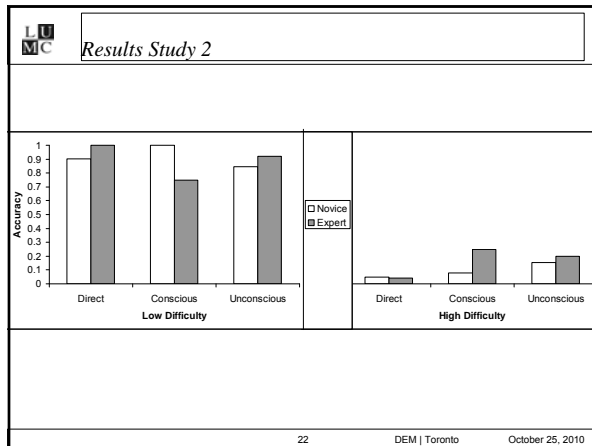
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**LU MC** Discussion

- \* Familiar (easy):
  - **Experts perform worst** after CT
    - well-developed intuition, through experience
    - CT: inappropriate weights
  - **Novices perform best** after CT
    - Little experience
    - Recently learned explicit classification rules
- \* Unfamiliar (difficult):
  - **Experts outperform novices**
  - No direct response available, additional processing required

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**LU MC** Conclusion

Thought process modes affect diagnostic classifications

- Familiar (easy):
  - Conscious thought helps novices, hampers experts
- Unfamiliar (difficult):
  - Additional processing required
  - A brief period of distraction seems to help

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**LU**  
**MC** *Thanks to*

Thanks to

- Floor Vente
- Marlous Arens
- Thijs Aubel

for their help with collecting the data, and ...

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**LU**  
**MC** **Thought process effects in diagnostic decisions**

**Thank you very much for your attention!**

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**LU**  
**MC** *Results per casus (Study 1)*

Number of Correct Classifications	Case 1 (Music student)		Case 2 (Skinny Tim)	
	Unconscious Processing	Conscious Processing	Unconscious Processing	Conscious Processing
0	13	20	0	1
1	17	18	5	14
2	10	2	35	25

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	<i>Results Confidence (Study 1)</i>
<b>Confidence in classifications (1-10):</b>	
<ul style="list-style-type: none"><li>• No processing condition effect, <math>F &lt; 1</math>.</li><li>• Unrelated to # of correct classifications, <math>r(80) = .05, ns</math>.</li> <li>• Female participants scored higher (<math>M = 6.77, SD = 1.27</math>) than males (<math>M = 5.67, SD = 1.70</math>), <math>F(1,79) = 6.93, p &lt; .02, \eta_p^2 = .08</math></li><li>• ... but did not score better on the classification measure, <math>F &lt; 1</math>.</li></ul>	
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