

# Update on Diagnosis of Autism Spectrum Disorders

อ.จรรยา จุฑาภิติทธี

ภาควิชากุมารเวชศาสตร์ โรงพยาบาลรามาธิบดี

21 July 2011



## Upward trends in prevalence rates for all ASDs

- **1 in 110** school age children

(Kogan MD *et al.* Pediatrics, 2009)

- **0.7-0.9 : 100** in birth cohort study

(Manning SE *et al.* Pediatrics, 2011)



**The rapid increase in the prevalence of  
ASDs has created  
a great demand for **diagnostic**  
and **treatment** services**





# Difficulties in diagnosis of ASDs

**The symptoms and behaviours lie on a **continuum** and have considerable clinical **heterogeneity****

(Szatmari P. J Psychiatry Neurosci 1999;24:159-65)

**Around 50% of PDD-NOS cases, could have been overdiagnosed, whereas around 22% were underdiagnosed**

(Chawarska K *et al.* J Child Psychol. Psychiatry 2007;48:128-38)



# Comprehensive evaluation

**History**

**Physical exam**

**Parent interview**

**Child observation**

**Developmental /psychometric  
evaluation**

**Presence of the  
DSM-IV-TR diagnosis  
preferably with **standardized tools****



**Clinical judgment based on the  
DSM-IV-TR criteria **combine with**  
ADI-R and ADOS assessment**

# Standardized Diagnostic Instruments

**Autism Diagnostic  
Interview-Revised  
(ADI-R)**



**Autism Diagnostic  
Observation Schedule  
(ADOS)**



**Developmental, Dimensional and  
Diagnostic Interview (3Di)**



Always

Unique

Totally

Interesting

Sometimes

Mysterious







# **D**evelopmental, **D**imensional and **D**iagnostic **I**nterview (3Di)

**Developed at Great Ormond Street Children Hospital  
by Prof David Skuse**



A graphic showing the letters A, D, I, and M in various colors (yellow, blue, red, green) arranged in a 3D perspective. The letters are slightly overlapping and have a soft shadow.

# Developmental, Dimensional and Diagnostic Interview (3Di)

- **Sensitivity of 1 and specificity of 0.98**
- **PPV = 0.93**

(Skuse D *et al.* J Am Acad Child Adolesc Psychiatry 2004;43:548-58)

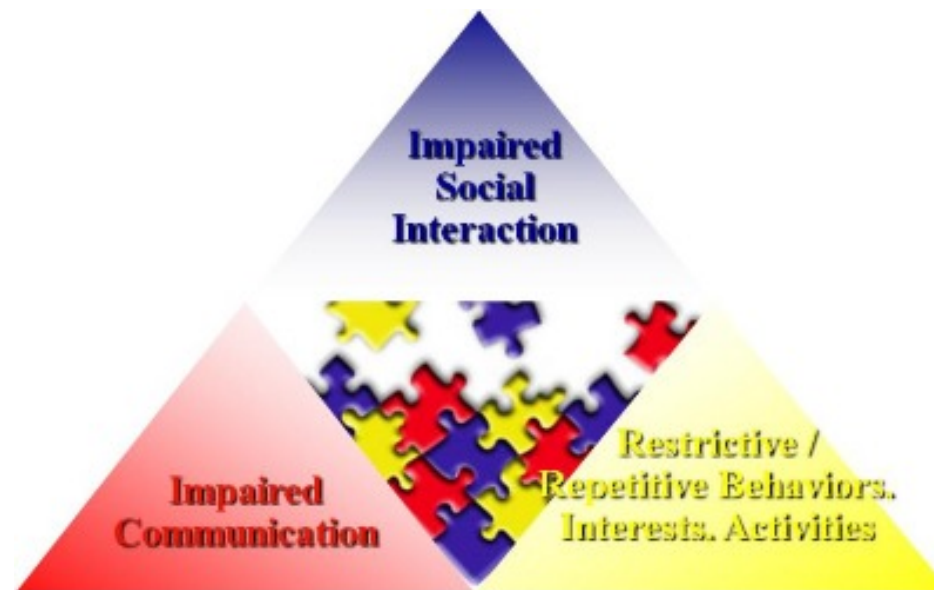
- **Excellent agreement with the ADI-R**

(Santosh PJ *et al.* Eur Child Adolesc Psychiatry 2009;18:521-4)

- **Translated into Finnish, Chinese, Spanish, Norwegian and Dutch**

# Developmental, Dimensional and Diagnostic Interview (3Di)

- **Computer-based diagnostic interview**
- **Offers a dimensional assessment of each domain of the triad of ASDs**



The title 'Developmental, Dimensional and Diagnostic Interview (3Di)' is overlaid on a graphic of colorful 3D block letters spelling 'ADOS-M'. The letters are in various colors: 'A' is yellow, 'D' is blue, 'O' is pink, 'S' is green, and 'M' is light blue. The letters are arranged in a slightly overlapping, perspective view.

# Developmental, Dimensional and Diagnostic Interview (3Di)

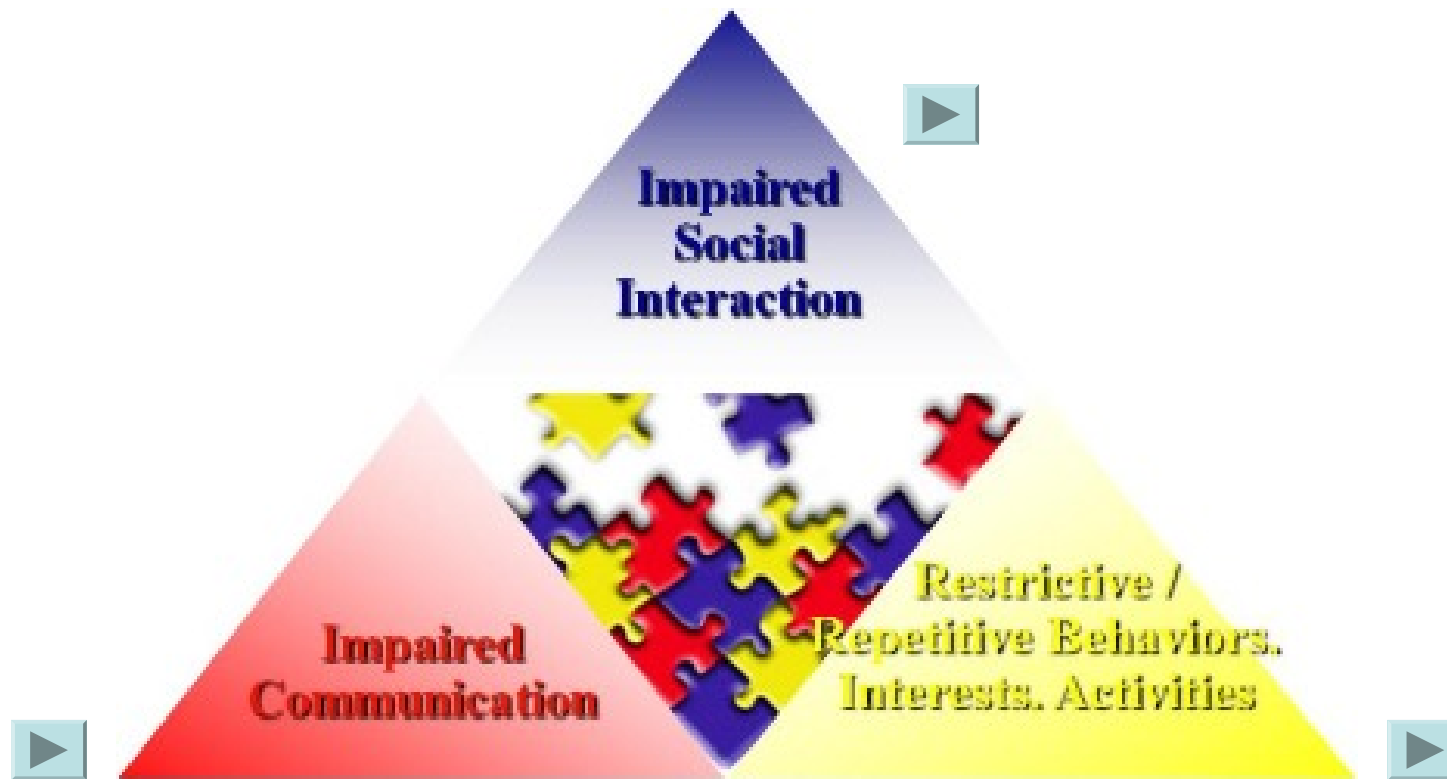
- The original interview: **266 questions**
- An abbreviated interview: **53 questions**
- Excellent agreement of the abbreviated 3Di with the original 3Di
- Focuses on **current behaviour**
- Extends to **co-morbid disorders**
- All data are automatically readable into **SPSS** for analysis

A graphic showing the letters A, D, A, M, S in 3D block letters, each a different color (yellow, blue, red, green, yellow). The letters are arranged in a slightly overlapping, horizontal line.

# Developmental, Dimensional and Diagnostic Interview (3Di)

- **Uses with 3-18 years old children**
- **Generates subscales**
  1. **social reciprocity**
  2. **use of language and other social communication skills**
  3. **use of gesture and non-verbal play**
  4. **receptive/ stereotyped behaviours and routines**

# Developmental, Dimensional and Diagnostic Interview (3Di)



# Use of language

(example of questions)

- ก่อนที่เด็กจะสามารถพูดได้ เด็กสามารถส่งเสียงเพื่อทำการสื่อสารกับผู้อื่นได้หรือไม่ เช่น เด็กอาจจะสื่อสารกับพ่อแม่โดยการส่งเสียงโต้ตอบ สลับกับพ่อแม่ เด็กเคยทำเช่นนี้หรือไม่
  - บ่อยๆครั้ง  บางครั้ง  ไม่เคยเลย
- เด็กมีวลีหรือประโยคที่ชอบพูดซ้ำไปซ้ำมา ซึ่งบางครั้งดูไม่เหมาะสมหรือไม่
  - ไม่เคยเลย  ทำเป็นบางครั้ง  ทำบ่อยๆครั้ง  ประเมินไม่ได้



# Social reciprocity

## (example of questions)

- เด็กเคยนำสิ่งของมาโชว์พ่อแม่ หรือเล่าถึงบางอย่างที่เขาได้พบหรือได้เรียนมา หรือต้องการให้พ่อแม่ร่วมกิจกรรมที่เขากำลังเพลิดเพลินหรือไม่
  - บ่อยๆครั้ง  บางครั้ง  ไม่เคยเลย
- เด็กรับรู้ที่พ่อแม่เสียใจเฉพาะเวลาที่คุณแสดงออกอย่างชัดเจน เช่น ร้องไห้ เด็กไม่สามารถที่จะเข้าใจความรู้สึกของพ่อแม่ ถ้าไม่ได้แสดงออกอย่างชัดเจน
  - บ่อยๆครั้ง  บางครั้ง  ไม่เคยเลย






# Receptive/ stereotyped behaviours

(example of questions)

- เด็กเคยแสดงความสนใจหมกมุ่นกับสิ่งบางอย่างในลักษณะแปลกๆ ซึ่งสิ่งเหล่านั้นไม่เป็นที่สนใจของเด็กคนอื่นๆ เช่น ขวดพลาสติก กุญแจ ก้อนหิน เป็นต้น หรือไม่
  - ไม่หมกมุ่นเลย
  - หมกมุ่นเล็กน้อย
  - หมกมุ่นเป็นประจำ
  - หมกมุ่นมากจนส่งผลกระทบต่อการใช้ปฏิสัมพันธ์ทางสังคมกับผู้อื่น



Main menu



**3Di** research

- Select and open backend
- Create and open backend
- Merge backends
- Add and interview patients
- Run Disorder Tester
- Export data to SPSS
- Close 3Di

Case manager

Find:  Case\_ID:

---

Surname:  Patient number:

Forename:

ForeNow:

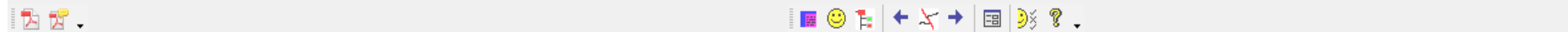
Gender:  Interview date:

DOB:

---

Current interview	Current subject			
<input type="text" value="None"/>	<input type="button" value="Revisit interview"/>	<input type="button" value="Report"/>	<input type="button" value="PDD Report"/>	<input type="button" value="Delete"/>
<input type="button" value="Close interview"/>		<input type="button" value="Disorders Test"/>		
		<input type="button" value="Go to documents"/>		<input type="button" value="Save"/>

Record:       of 109



- 8.8.7 Can Panupong recognise verbal hints? - for example: "Your room looks a mess" as a request that the room be tidied. Of course, he may recognise a hint but prefer to pretend that he has not. Our question is, how readily can Panupong do the recognising?
- 8.8.8 In the same way, how readily can Panupong recognise non-verbal hints? - for example, a raised eyebrow as a signal of disapproval.
- 8.8.9 Does Panupong get into trouble because he doesn't always understand the rules of polite behaviour? no, does not apply
- 8.8.10 Did he ever make embarrassing or tactless remarks about people - perhaps saying within their hearing that someone was very fat, or ugly. How did he react when you pointed out this was not the right way to behave? no, does not apply
- 8.8.11 Does Panupong treat everyone the same way, regardless of status - for example, he might talk to a headteacher just as he would to another child?

### 8.9 Rapport

I'd like to ask a few questions about the way in which Panupong relates to others in conversation. Would you say that ...

- 8.9.1 - Panupong ignores conversational cues from others (eg if asked "What are you making?" he might continue working as if nothing had happened)? applies somewhat
- 8.9.2 - he seldom or never starts up a conversation, and doesn't volunteer information about what has happened? applies somewhat
- 8.9.3 - Panupong can tell how you (as opposed to someone from outside his home) are feeling from your tone of voice without unusual difficult
- 8.9.4 - relative to his siblings he is in this respect ...
- 8.9.5 - Panupong can tell how an adult from outside his family is feeling from their tone of voice without unusual difficult
- 8.9.6 - he can tell how you (as opposed to someone from outside his home) are feeling from your facial expression without unusual difficult
- 8.9.7 - relative to his siblings Panupong is in this respect ...
- 8.9.8 - he can tell how an adult from outside his family is feeling from their facial expression
- 8.9.9 - Panupong doesn't seem to read facial expressions or tone of voice adequately, and may not realise when other people are upset or angry?
- 8.9.10 - he is poor at using facial expressions or gestures to convey his feelings, may look blank when anarv. or smile when anxious

Form View

# Report

*Patient number: 4166457*

*Age: 4 years 0 months*

## ⊕ Autism Spectrum Disorder subscales:

Subscale	Patient's score	Minimum with clinical significance	Maximum on subscale	Qs to do	Qs Dk
Social reciprocity	18.5	10	30		
Communication	10.2	8	26		
Non-verbal communication	6.7	7	14		
Repetitive behaviours	3.0	3	12		



# Comparison with other diagnostic tools

	ADOS	ADI-R	3Di
<b>Design</b>	interview & observation	interview	interview
<b>Age</b>	Non-verbal mental age ≥ 12 months	mental age 2 yrs-adult	3 yrs and up
<b>Duration</b>	30 - 45 minutes	1.5 - 2.5 hours	20 - 30 minutes
<b>Sensitivity/ Specificity</b>	< 36 mo: 97.5% / 59.3% ≥ 36 mo: 92% / 73% *	< 4 yrs: 85% / 85% ≥ 4 yrs: 84% / 83% **	100% / 97% ***
<b>Advantages</b>	Direct observation	Comprehensive coverage of symptoms	<ul style="list-style-type: none"> <li>• Comprehensive coverage of symptoms</li> <li>• No repeat on “current” and “ever” symptom questions</li> </ul>

\* Gotham K *et al.* J Am Acad Child Adolesc Psychiatry 2008;47:642-51

\*\* Le Couteur *et al.* J Autism Dev Disord 2008;38:362-72

\*\*\* Skuse D *et al.* J Am Acad Child Adolesc Psychiatry 2004;43:548-58



**Translation and Validation of the  
Developmental, Dimensional and  
Diagnostic Interview (3Di) for Diagnosis  
Autism Spectrum Disorders  
in Thai Children at Ramathibodi Hospital**

Chuthapisith J *et al*, submitted to Autism

# Research at Ramathibodi Hospital

63 children with ASDs

67 normal children

Vineland Adaptive Behaviour Scales (VABS)

3Di

Discriminant function analysis

# Demographic characteristics

Characteristics	ASDs group (N=63)	Typically developing group (N=67)
Mean age (years) (SD)	5.37 (1.24)	5.49 (1.55)
% male *	85.7	51.5
VABS scores Mean (SD) **	66.93 (17.67)	99.95 (14.8)

\*  $p < 0.05$ , \*\*  $p < 0.001$





# Comparison of the mean scores

Domains	ASDs group mean (SD)	Normal group mean (SD)
Social reciprocity*	13.42 (4.14)	7.03 (3.11)
Communication*	11.58 (3.7)	5.99 (3.12)
Repetitive behaviours*	3.46 (1.9)	1.71 (1.16)

\*  $p < 0.001$

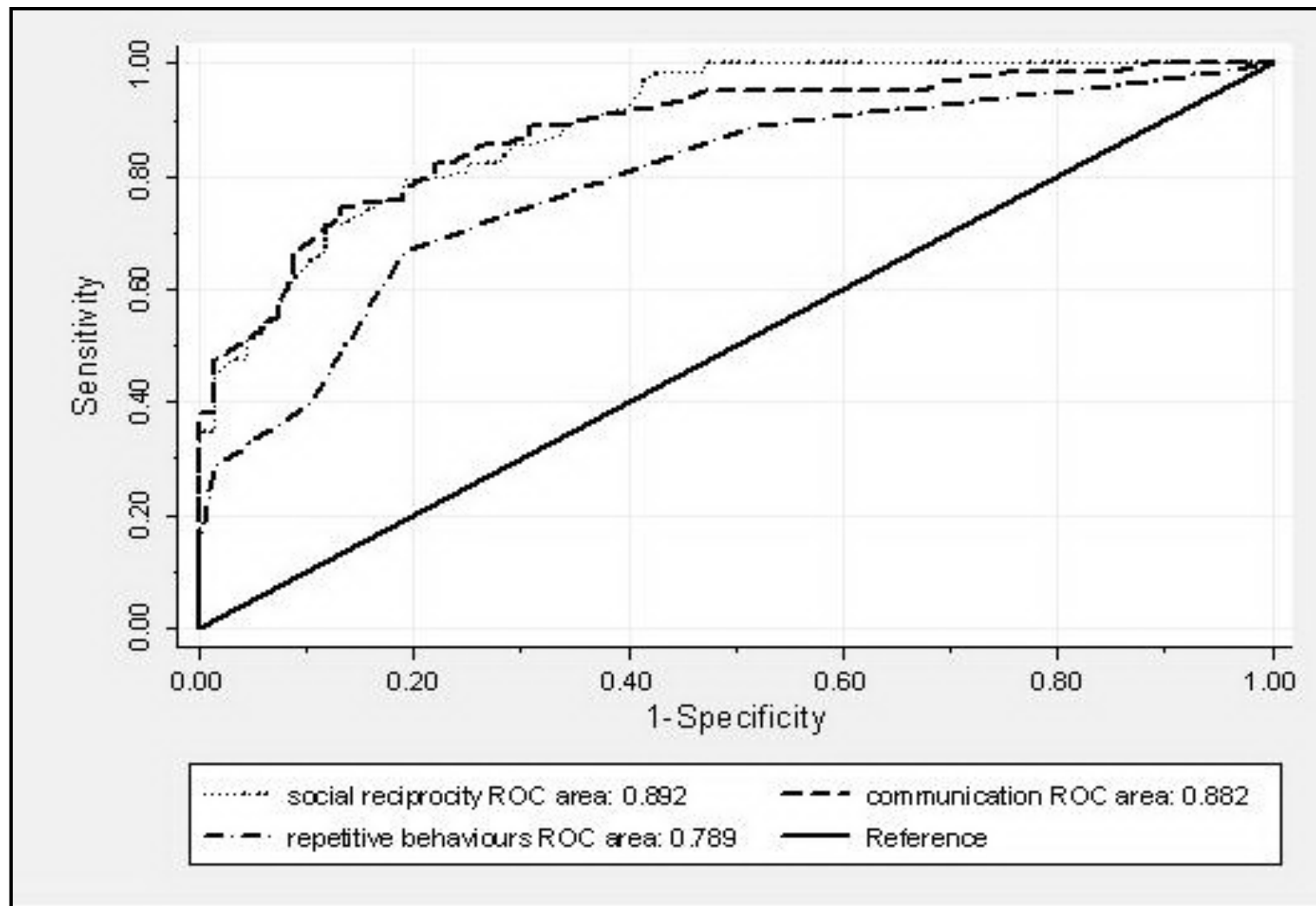


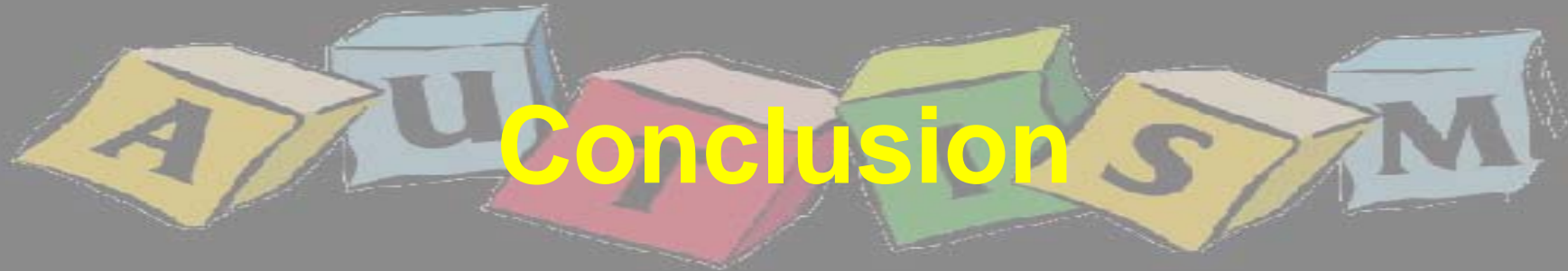
**Sensitivity, specificity, PPV and NPV  
for the 3Di cut-offs**

<b>Domains</b>	<b>Cut-offs</b>	<b>Sensitivity (%)</b>	<b>Specificity (%)</b>	<b>PPV</b>	<b>NPV</b>
<b>Social reciprocity</b>	<b>10</b>	<b>76.2</b>	<b>80.9</b>	<b>78.7</b>	<b>78.6</b>
<b>Communication</b>	<b>8</b>	<b>85.7</b>	<b>73.5</b>	<b>75</b>	<b>84.7</b>
<b>Repetitive behaviours</b>	<b>3</b>	<b>66.7</b>	<b>80.9</b>	<b>76.4</b>	<b>72.4</b>

# AUTISM

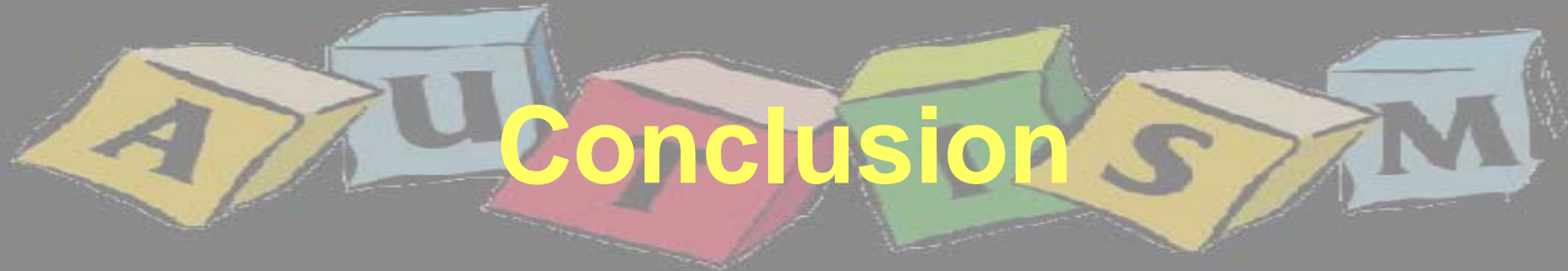
ROC curve in each domain





**The short 3Di Thai version is a useful diagnostic instrument for differentiating between children with ASDs and typically developing children**





- **Standardized diagnostic instruments have limitation in low validity in children under 2 years of age**
- **The time needed for administrations precludes their uses in many clinical settings**
- **All tools must be used by trained clinicians**



**All 18 and 24-month-old children  
should be screened for ASDs to  
promote earlier identification  
and intervention**



The puzzle pattern of this ribbon reflects the **mystery** and **complexity** of autism.

The different colors and shapes represents the **diversity** of people living with this disorder.

The **brightness** of the ribbon signals **hope** – hope through research and increasing awareness in people like “**you**”.

