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## Reliability of the CEReKi water competence testing battery

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## Introduction

- Assessing water competencies is critical during childhood since this period is very favorable to the development of ABC's of swimming
- Many **swimming federations** in many countries have developed **national tools** with the aim to assess children's level in water competencies
- However, most of them **haven't been scientifically validated**, and their psychometric qualities remain unknown
- ARA from Langendorfer & Bruyar (1995) is the only one validated
- In 2017 : validation of an original water competence testing battery, adapted to the children from 3 to 10 year old (Vidal, 2017)


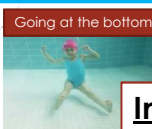
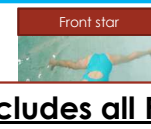
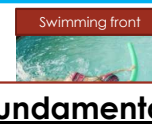
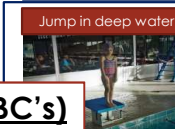
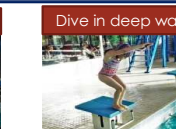
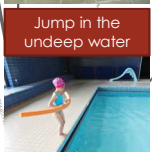
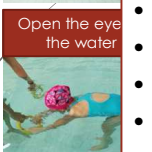
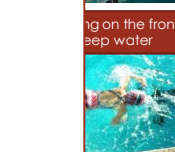
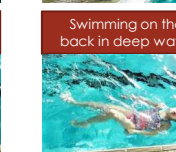
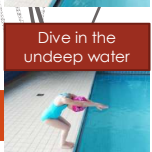

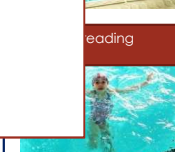
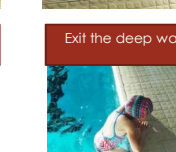
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# Aim of the study

- ▶ CEREKI validated aquatic competence testing battery
  - ▶ First objectives
    - ▶ Intra-evaluator reliability
    - ▶ Inter-evaluator reliability
  - ▶ Secondary objectives
    - ▶ Descriptive data
    - ▶ Testing battery simplification









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# Methods : testing battery (18 situations)

Undeep water				Deep water	
					
		<p><b>Includes all Fundamentals (ABC's)</b></p> <ul style="list-style-type: none"> <li>• Entry in the water (Ent)</li> <li>• Exit the water (Ext)</li> <li>• Buoyancy (By)</li> <li>• Immersion (Im)</li> <li>• Water Balance (WB)</li> <li>• Breath control (BC)</li> <li>• Propulsion (Pro)</li> <li>• View (V)</li> </ul>			
					

## Methods : testing battery

Example : Exercise 6 = Bubbles in the water

L1	L2	L3	L4	L5	L6	L7	L8
							
Blow on a tennis table ball	Keep breathing mouth at water level	Blow shortly with mouth under water	Blow >3sec with mouth under water	Blow shortly with mouth and noise under water	Blow >3sec with mouth and noise under water	Blow shortly with full face under water	Blow >3sec with full face under water

← Reduce level if child is not able

↑ Start with the highest level

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## Methods

- ▀ Subjects
 

	3 yo	4 yo	5 yo	6 yo	7 yo	8 yo	TOTAL
Subjects (n)	11	25	47	42	32	13	170
- ▀ Study design
 

PRE - TEST		POST - TEST		
Evaluator 1	→	Evaluator 1	}	Intra – évaluateur reliability
Evaluator 2	→	Evaluator 2		
1 to 7 days				
Evaluator 1	→	Evaluator 2	}	Inter – évaluateur reliability
Evaluator 2	→	Evaluator 1		

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## Results: intra-evaluator reliability

	Pretest	Post test	P-VALUE	R	agreement (%)	1 point error (%)	>2 points error (%)
Crocodile(3)	3(0)	3(0)	NS	0.83	97%	3%	0%
Jump UW(12)	12(0)	12(0)	NS	0.93	91%	4%	4%
Dive UW(5)	4.3(1.1)	4.4(1)	NS	0.95	89%	2%	9%
Immersion(10)	8.5(1.5)	8.8(1.4)	NS	0.94	76%	13%	11%
Vision(2)	1.3(0.8)	1.4(0.8)	NS	0.78	80%	16%	4%
Bubbles(8)	7.7(0.6)	7.8(0.5)	NS	0.89	86%	12%	2%
Front star (5)	4.3(1)	4.5(0.8)	NS	0.94	81%	17%	2%
Back star(5)	4.4(0.9)	4.5(0.7)	NS	0.94	84%	14%	1%
Arrow (7)	6.2(1.6)	6.3(1.5)	NS	0.95	89%	9%	2%
Swim front.1(4)	3.7(0.6)	3.8(0.6)	NS	0.97	94%	6%	0%
Swim Back.1(5)	4.6(0.8)	4.6(0.8)	NS	0.98	91%	9%	0%
Exit UW(2)	2(0,1)	2(0,1)	NS	0.86	96%	3%	1%
Jump DW(13)	12.4(1.6)	12.5(1.1)	NS	0.98	87%	8%	6%
Dive DW(7)	4.9(2)	5.2(1.8)	p<0.05	0.93	80%	11%	9%
Swim front.2(4)	3.7(0.7)	3.7(0.6)	NS	0.96	91%	9%	0%
Swim back.2(4)	3.6(0.8)	3.6(0.8)	NS	1	99%	1%	0%
Treading (5)	3.6(1.5)	3.8(1.4)	p<0.05	0.96	83%	12%	4%
Exit DW(2)	2(0,1)	2(0,1)	NS	1	100%	0%	0%
Total score	74.34(24)	75.21(26)	P<0,001	0.98			CV = 2,6 %

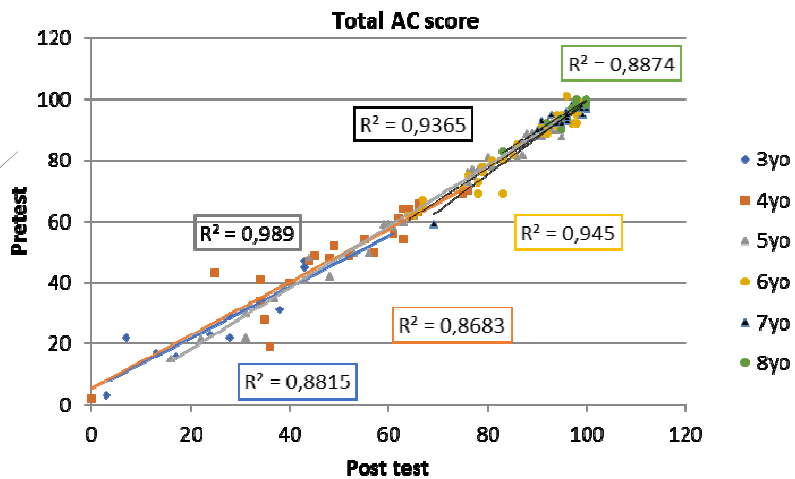
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## Results: inter-evaluator reliability

	Pretest	Post test	P-VALUE	R	agreement (%)	1 point error (%)	>2 points error (%)
Crocodile(3)	2.7(0.5)	2.7(0.6)	NS	<b>0.78</b>	89%	7%	4%
Jump UW(12)	10.5(3)	10.5(3)	NS	0.99	95%	3%	3%
Dive UW(5)	2.6(1.7)	2.7(1.7)	NS	0.92	82%	14%	5%
Immersion(10)	6(2.4)	6(2.3)	NS	0.94	<b>71%</b>	15%	<b>14%</b>
Vision(2)	0.7(0.8)	0.7(0.8)	NS	<b>0.72</b>	<b>73%</b>	25%	3%
Bubbles(8)	5.9(2)	6(2)	NS	0.87	<b>66%</b>	24%	<b>10%</b>
Front star (5)	2.3(1.7)	2.5(1.7)	NS	0.89	<b>71%</b>	15%	<b>14%</b>
Back star(5)	2.5(1.6)	2.5(1.7)	NS	0.89	<b>74%</b>	20%	6%
Arrow (7)	2.6(2.7)	2.8(2.8)	NS	0.94	<b>79%</b>	13%	6%
Swim front.1(4)	2.4(1.3)	2.4(1.4)	NS	0.94	81%	15%	4%
Swim Back.1(5)	2.8(1.6)	2.8(1.7)	NS	0.98	85%	14%	1%
Exit UW(2)	1.5(0.7)	1.6(0.7)	NS	0.84	96%	3%	1%
Jump DW(13)	8.5(4.8)	8.7(4.7)	NS	0.98	86%	10%	4%
Dive DW(7)	1.7(1.9)	1.9(1.9)	P<0.05	0.96	<b>79%</b>	14%	8%
Swim front.2(4)	2.1(1.4)	2.1(1.5)	NS	0.96	86%	9%	5%
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Exit DW(2)	1.5(0.7)	1.5(0.7)	NS	0.94	95%	5%	0%
Total score	74.3(26)	75.6(27)	P<0,001	0.98			CV = 6,2 %

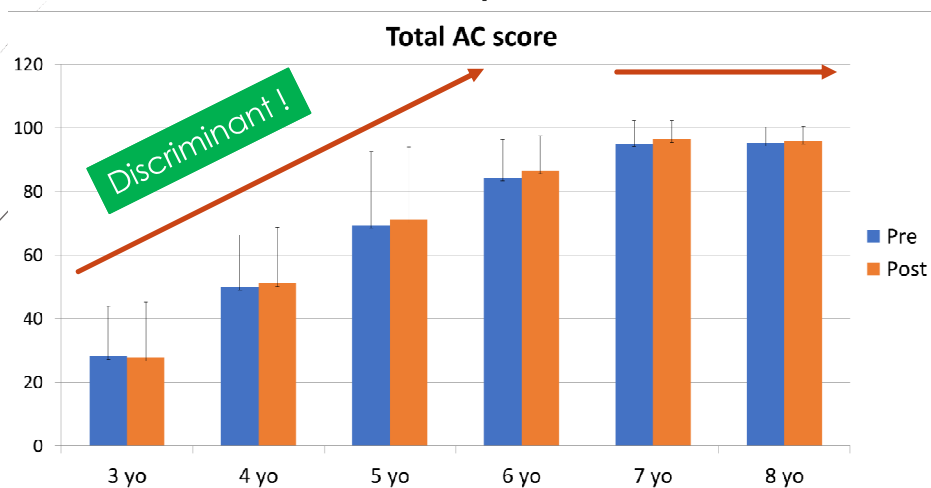
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## Results : descriptive data



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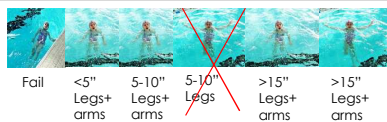
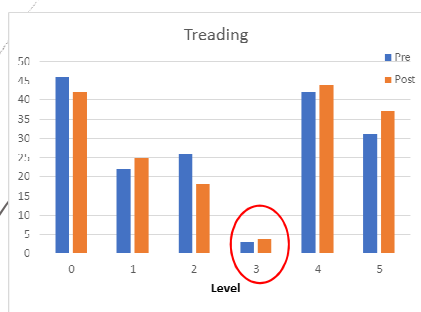
## Results : descriptive data



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# Results : testing battery simplification

➤ Superficial level to remove



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➤ Adapt the test to age/level

	3	4	5	6	7	8	Indicateurs	Photos	Pts
1	Red	Green	Green	Green	Green	Green	-Rôle du moniteur : aucun. -Consignes : « Placer les pieds en position verticale dans l'eau sans appui extérieur et descendre à l'aide de ses bras et de sa respiration jusqu'à une profondeur de 2m ». -Indicateurs : en descendant dans l'eau en position verticale sans appui, l'enfant descend sans aide jusqu'à une profondeur de 2m.		8
2	Yellow	Green	Green	Green	Green	Green	-Rôle du moniteur : tenir un bâton et maintenir une perche verticalement. -Consignes : « Tenir le bâton et descendre à l'aide de ses bras et de sa respiration jusqu'à une profondeur de 2m ». -Indicateurs : l'enfant descend avec l'aide d'une perche tenue verticalement par le moniteur jusqu'à une profondeur de 2m.		7
3	Red	Green	Green	Green	Green	Green	-Rôle du moniteur : aucun. -Consignes : « descendre au fond de l'eau. On ne dort pas à l'eau ». -Indicateurs : l'enfant s'allie au fond de l'eau.		6
4	Yellow	Green	Green	Green	Green	Green	-Rôle du moniteur : dans l'eau et maintient une planche à l'horizontale. -Consignes : « Placer sous la planche sans la soulever ». -Indicateurs : l'enfant passe sous une planche posée à l'horizontale.		5
5	Yellow	Green	Green	Green	Green	Green	-Rôle du moniteur : aucun. -Consignes : « Couler sur son corps dans l'eau ». -Indicateurs : l'enfant immerge complètement sa tête et son corps dans l'eau de manière brève.		4
6	Red	Green	Green	Green	Green	Green	-Rôle du moniteur : aucun. -Consignes : « Couler sur son visage dans l'eau ». -Indicateurs : l'enfant immerge tout son visage (dos, nez, yeux) dans l'eau de manière brève.		3
7	Red	Green	Green	Green	Green	Green	-Rôle du moniteur : aucun. -Consignes : « Couler et boire et non reculer l'eau ». -Indicateurs : l'enfant immerge sa bouche et son nez dans l'eau.		2

# Conclusion

- Excellent global intra and inter reliability
- 5 situations are needing particular attention :
  - Vision, immersion, bubbles, back star and front star
- Well adapted to children ages from 3 to 8 YO
- Too many situations with too many levels
  - 20 minutes per children => Time consuming
  - Simplifications are needed
  - Adaptive test should be developed

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# Thanks for your attention



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## References

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- Mornard, M., Delvaux, A., Cloes, M., & Jidovtseff, B. (2015). L'accoutumance à l'eau: un préalable au savoir-nager. *Éducation Physique et Sport*, (364), 16-20.
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