

A Drowning Risk Assessment (DRA) Observation Instrument: A Developmental Proposal

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Aims/ Objectives/ LOs

- Examine and modify components of the **Aquatic Readiness Assessment (ARA)** to propose its converse, the **Drowning Risk Assessment (DRA)**, for potentially identifying swimmers/bathers at risk of drowning.
- **LO:** At the conclusion of my session, participants should better appreciate concepts of the developmental perspective, developmental sequences, dynamical constraints, and a potential drowning observational assessment instrument.

Introduction

- The **ARA** component sequences for body position, arm and leg actions, and front swimming each describe progressively-ordered categories that validly and reliably assess the development of swimming.
- The current proposal addresses the need to establish validity and reliability of a **DRA** as an observational drowning risk assessment instrument by using existing collections of videos which capture both swimmers and drowning victims.

Theoretical Background

- Concept of *developmental perspective* – an expectation that all human behavior changes across the human lifespan (and moment to moment)
- *Developmental sequence research* – the study of how coordination patterns and behavior change qualitatively over time
- *Developmental sequences* (a.k.a., “stages”) – developmental assessment instruments with theoretical implications and clinical applications.

Developmental Characteristics

Developmental change has a number of unique characteristics:

- **Qualitative** nature
- **Sequential** order
- **Cumulative** and hierarchic relationships
- **Bi-directional continuum**
- **Complex** behavior
- **Multi-causal** determinants

Developmental Directionality

- This study addresses the unique, but little-studied principle of **developmental directionality** that asserts movement changes such as swimming skills can occur in both *progressive* and *regressive* linear sequences.
- The **Aquatic Readiness Assessment** proposes a **progressive order of acquisition or improvement**
- The **Drowning Risk Assessment** proposes the *converse*: a **regression in movement performance**

Dynamical Systems Theory

- Development is *multi-directional* (i.e., progressive and regressive) because change can be explained as possessing *dynamically emergent properties* associated with *constraints* and *affordances*
- **Constraints** (both *enabling* and *disabling*) are **relationships** among individual characteristics, task factors, and environmental conditions.
- *Enabling constraints -> developmental progression*
- *Disabling constraints -> developmental regression*

Aquatic Readiness Assessment

- [Figure 10](#) – Nine developmental components of the Aquatic Readiness Assessment (ARA)

My Proposition: DRA from ARA

Table 4.5 Body Position Checklist

Step/level:	Decision rule
1. Vertical	Trunk 90° to 45° from horizontal surface
2. Inclined	Trunk 44° to 20° from horizontal
3. Level	Trunk 19° to 10° from horizontal
4. Horizontal	Trunk maintained less than 10° from horizontal

Note: Adapted from Langendorfer et al. (1987) and Wiecki and Houhen (1987).

Table 4.6 Arm Propulsion Action Checklist

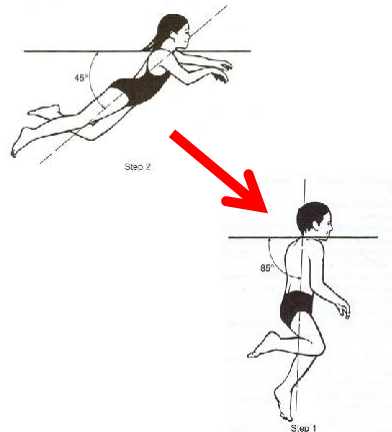
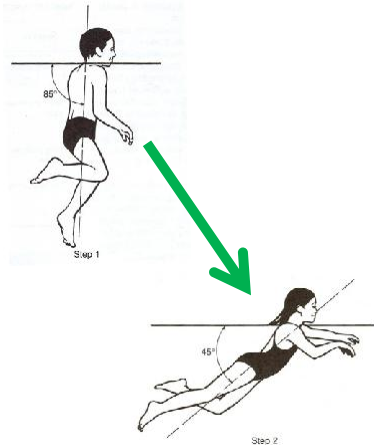
Step/level	Decision rule
1. No arm action	Arms not used in a propulsive action; they either hang at the side or extend forward.
2. Short downward push	Arm pushes downward rapidly with virtually no backward pulling action; action is short and rapid with little forward propulsive action.
3. Long push-pull paddle	Arm action initially is downward push, followed by backward pull with arm extension.
4. Lift propulsion	Arm enters water by diving forward, catching and pulling backward with an "S" pull action, "high" elbow, and rapid backward acceleration; main propulsion is lift rather than paddle action.

Note: Adapted from Langendorfer et al. (1987) and Cool (1992).

Example: Changing Body Position

ARA = *reducing* body angle

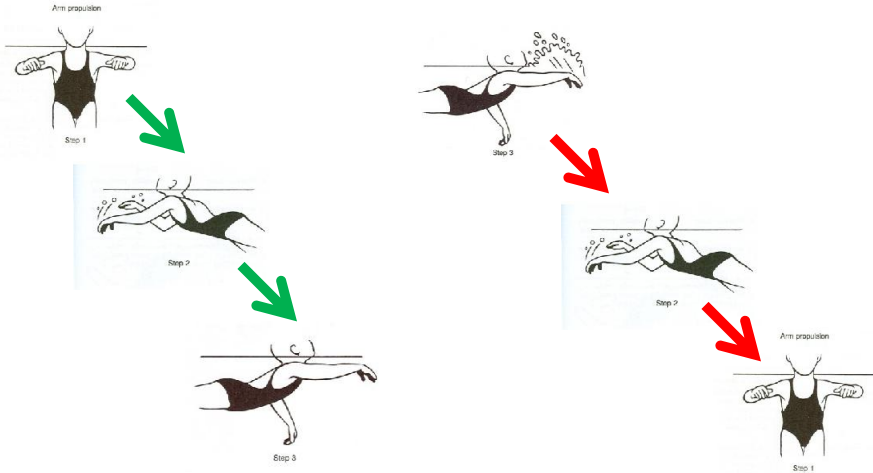
DRA = *increasing* angle



Example: Changing Arm Actions

ARA=progressive changes

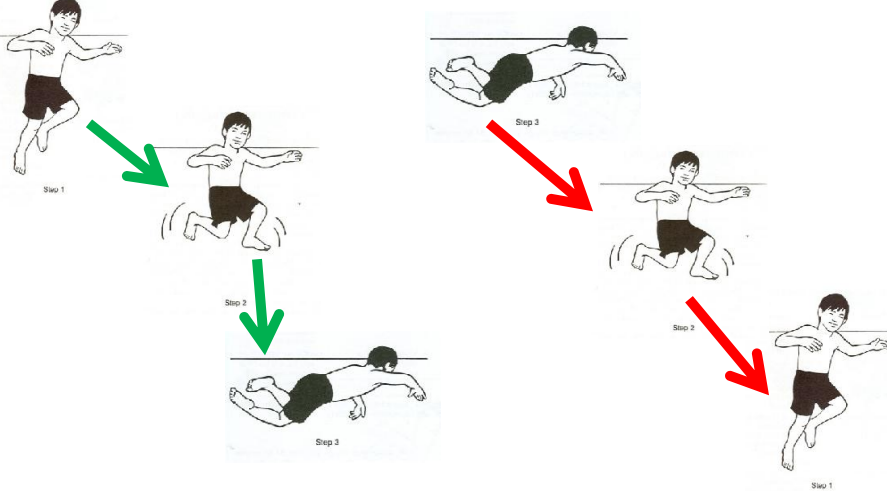
DRA = regressive changes



Example: Changing Leg Kicking

ARA=increasing effectiveness

DRA=decreasing effectiveness



Assessment Instrument Principles

- **Validity** (accuracy) – does it measure what it intends?
- **Reliability** (consistency) – are the behaviors repeatable?
- **Rater objectivity** – can different observers use the instrument consistently and similarly?
- **Feasibility** – is the instrument usable and useful in the field?

Developmental Assessment

- Selected components the **ARA** each have established levels of *validity, reliability, and objectivity* for the purpose of assessing swimming development (i.e., progressive change). The validity and reliability coefficients of component categories described in reverse order for use as the **DRA** need to be established by empirical study.
- **Developmental validity:** examines the degree to which drowning victims recorded on video are observed to transition (regardless of time frame) from low risk behaviors to higher risk behaviors in the order described across individuals.
- **Developmental reliability:** requires estimates of how consistently those transitions occur among individuals as opposed to going immediately from low-risk to high risk patterns abruptly
- **Intra- and inter-observer objectivity:** Factors such as live vs. video, weather and water conditions and number of swimmers will impact observer behaviors.

An Example?



Courtesy of Francesco Pia, *On Drowning* DVD

Does It Work? Will It Work?

DRA may be valuable with two different, but complementary results:

- Drowning situations are observed to occur in a *regressive developmental order*
- Simple presence of these rudimentary movement patterns signals potential distress
- Along with learning and using effective scanning patterns, lifeguards should use the drowning risk assessment (DRA) as a scanning observation tool for recognizing changes or situations of drowning
- DRA (and ARE) may provide other assessment options for such projects as Can You Swim

Discussion

- Progressive change – as validated by the ARA emerges from a variety of individual and experiential constraints (e.g., growth, experience) normally imposed over time
- Regressive change - from a state of swimming with lower risk of drowning to becoming a drowning victim is likely caused by rapidly-altering and interacting individual, task, and environmental factors such as fatigue, distance, depth, local conditions, and weather.
- How well the DRA can evaluate those constraints now needs to be systematically tested in both empirical and clinical settings.

Conclusions

- Converting the developmental Aquatic Readiness Assessment (ARA) into its converse, the Drowning Risk Assessment (DRA), holds promise for
 - assessing the risk of drowning associated with specific aquatic movement patterns; and
 - investigating further the links and associations between capability in swimming and likelihood of drowning.

Questions? Your Ideas?

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- World Drowning statistics