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 development **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>
<thead>
<tr>
<th>Step/level</th>
<th>Decision rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical</td>
<td>From 0º to 45º from horizontal surface</td>
</tr>
<tr>
<td>Inclined</td>
<td>From 1º to 20º from horizontal</td>
</tr>
<tr>
<td>Level</td>
<td>From 19º to 10º from horizontal</td>
</tr>
<tr>
<td>Horizontal</td>
<td>From maintained less than 10º from horizontal</td>
</tr>
</tbody>
</table>

*Note:* Adapted from Langendorfer et al. (1987) and Wieland and Hütten (1987).

### Table 4.6 Arm Propulsion Action Checklist

<table>
<thead>
<tr>
<th>Step/level</th>
<th>Decision rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>No arm action</td>
<td>Arms not used in a propulsive action; they either hang at the side or extend forward.</td>
</tr>
<tr>
<td>Short push-pull</td>
<td>Arm pushes downward rapidly with virtually no backward-pull action; action is short and rapid with little forward propulsive action.</td>
</tr>
<tr>
<td>Long push-pull</td>
<td>Arm action initially in downward push, followed by backward pull with arm extension.</td>
</tr>
<tr>
<td>Lift propulsion</td>
<td>Arm crosses water by moving forward, catching, and pulling backward, followed by an &quot;S&quot; pull action; &quot;High&quot; elbow, and rapid backward action; when main propulsion is lift rather than paddle action.</td>
</tr>
</tbody>
</table>

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

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**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**?

![Image](image_url)

Courtesy of Francesco Pia, *On Drowning DVD*

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**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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References

• World Drowning statistics