

**ERRATA:**

Tables 1 and 3 from the paper by J. Tarr and G. Jones, which was published in May, 1997 in the *Mathematics Education Research Journal*, 9(1), 39–59, have been reproduced here with the additional headings Level 3 and Level 4 which were omitted in *MERJ* 9(1).

Table 1

*Initial Framework for Assessing Middle School Students' Thinking in Conditional Probability and Independence*

	<b>LEVEL 1</b> (Subjective)	<b>LEVEL 2</b> (Transitional)
CONDITIONAL PROBABILITY	<ul style="list-style-type: none"> <li>• Recognises when "certain" and "impossible" events arise in replacement and non-replacement situations.</li> <li>• Generally uses subjective reasoning in considering the conditional probability of any event in a "with" or "without" replacement situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognises that the probabilities of <i>some</i> events change in a "without replacement" situation. Recognition is incomplete, however, and is usually confined to events that have previously occurred.</li> <li>• May revert to subjective judgments or use inappropriate quantitative measures.</li> </ul>
INDEPENDENCE	<ul style="list-style-type: none"> <li>• Unaware that two events may or may not influence each other.</li> <li>• Holds a pervasive belief that they can control the outcome of an event.</li> <li>• Uses subjective reasoning which precludes any meaningful focus on the independence or dependence of events.</li> </ul>	<ul style="list-style-type: none"> <li>• Shows some recognition as to whether consecutive events are related or unrelated.</li> <li>• Frequently uses a "representativeness" strategy, either a positive or negative recency orientation.</li> <li>• May also revert to subjective reasoning.</li> </ul>
	<b>LEVEL 3</b> (Informal Quantitative)	<b>LEVEL 4</b> (Numerical)
CONDITIONAL PROBABILITY	<ul style="list-style-type: none"> <li>• Keeps track of the complete composition of the sample space in judging the relatedness of two events in both "with" and "without" replacement situations.</li> <li>• Recognises that the probabilities of all events change in a "without replacement" situation, and that none change in a "with replacement" situation.</li> <li>• Can quantify, albeit imprecisely, changing probabilities in a "without replacement" situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Assigns numerical probabilities in "with" and "without" replacement situations.</li> <li>• Uses numerical reasoning to compare the probabilities of events before and after each trial in "with" and "without" replacement situations.</li> </ul>
INDEPENDENCE	<ul style="list-style-type: none"> <li>• Recognises when the outcome of the first event does or does not influence the outcome of the second event. In "with replacement" situations, sees the sample space as restored.</li> <li>• Can differentiate, albeit imprecisely, independent and dependent events in "with" and "without" replacement situations.</li> <li>• May revert to the use of a representativeness strategy.</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguishes dependent and independent events in "with" and "without" replacement situations, using numerical probabilities to justify their reasoning.</li> </ul>

Table 3

*Refined Framework for Assessing Middle School Students' Thinking in Conditional Probability and Independence*

	LEVEL 1 (Subjective)	LEVEL 2 (Transitional)
CONDITIONAL PROBABILITY	<ul style="list-style-type: none"> <li>• Recognises when "certain" and "impossible" events arise in replacement and non-replacement situations.</li> <li>• Generally uses subjective reasoning in considering the conditional probability of any event in a "with" or "without" replacement situation.</li> <li>• Ignores given numerical information in formulating predictions.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognises that the probabilities of <i>some</i> events change in a "without replacement" situation. Recognition is incomplete, however, and is usually confined to events that have previously occurred.</li> <li>• <i>Inappropriate use of numbers in determining conditional probabilities. For example, when the sample space contains two outcomes, always assumes that the two outcomes are equally likely.</i></li> <li>• <i>Representativeness acts as a confounding effect when making decisions about conditional probability.</i></li> <li>• May revert to subjective judgments.</li> </ul>
INDEPENDENCE	<ul style="list-style-type: none"> <li>• <i>Predisposition to consider that consecutive events are always related.</i></li> <li>• Pervasive belief that they can control the outcome of an event.</li> <li>• Uses subjective reasoning which precludes any meaningful focus on the independence.</li> <li>• <i>Exhibits unwarranted confidence in predicting successive outcomes.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Shows some recognition as to whether consecutive events are related or unrelated.</li> <li>• Frequently uses a "representativeness" strategy, either a positive or negative recency orientation.</li> <li>• May also revert to subjective reasoning.</li> </ul>
	LEVEL 3 (Informal Quantitative)	LEVEL 4 (Numerical)
CONDITIONAL PROBABILITY	<ul style="list-style-type: none"> <li>• Recognises that the probabilities of all events change in a "without replacement" situation, and that none change in a "with replacement" situation.</li> <li>• Keeps track of the complete composition of the sample space in judging the relatedness of two events in both "with" and "without" replacement situations.</li> <li>• Can quantify, albeit imprecisely, changing probabilities in a "without replacement" situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Assigns numerical probabilities in "with" and "without" replacement situations.</li> <li>• Uses numerical reasoning to compare the probabilities of events before and after each trial in "with" and "without" replacement situations.</li> <li>• <i>States the necessary conditions under which two events are related.</i></li> </ul>
INDEPENDENCE	<ul style="list-style-type: none"> <li>• Recognises when the outcome of the first event does or does not influence the outcome of the second event. In "with replacement" situations, sees the sample space as restored.</li> <li>• Can differentiate, albeit imprecisely, independent and dependent events in "with" and "without" replacement situations.</li> <li>• May revert to the use of a representativeness strategy.</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguishes dependent and independent events in "with" and "without" replacement situations, using numerical probabilities to justify their reasoning.</li> <li>• <i>Observes outcomes of successive trials but rejects a representativeness strategy.</i></li> <li>• <i>Reluctance or refusal to predict outcomes when events are equally likely.</i></li> </ul>