

**MAIMON RESEARCH LLC**  
**ARTIFICIAL INTELLIGENCE LARGE LANGUAGE  
MODEL INTERROGATION**



**REPRESENTATIONAL MEASUREMENT FAILURE IN  
HEALTH TECHNOLOGY ASSESSMENT**  
**NEW ZEALAND: THE ABSENCE OF  
REPRESENTATIONAL MEASUREMENT IN HEALTH  
TECHNOLOGY ASSESSMENT AT THE UNIVERSITY OF  
AUCKLAND**

**Paul C Langley Ph.D Adjunct Professor, College of Pharmacy, University of  
Minnesota, Minneapolis, MN**

**LOGIT WORKING PAPER No 779 MAY 2026**

**[www.maimonresearch.com](http://www.maimonresearch.com)**

**Tucson AZ**

# FOREWORD

## HEALTH TECHNOLOGY ASSESSMENT: A GLOBAL SYSTEM OF NON-MEASUREMENT

The University of Auckland supports a broad range of activities in health technology assessment (HTA), health economics, health policy, and outcomes research through its Faculty of Medical and Health Sciences and associated public health and policy units. Unlike some dedicated pharmacoeconomic centers, the Auckland HTA environment is distributed across several academic groups involved in economic evaluation, healthcare systems research, decision modeling, public health policy, and population outcomes analysis.

A major focus of Auckland HTA-related activity is the evaluation of healthcare interventions and policy initiatives within the New Zealand health system, particularly in relation to cost-effectiveness, resource allocation, equity, and access to care. Faculty associated with these activities undertake research in economic evaluation, utility assessment, quality-of-life measurement, simulation modeling, and comparative effectiveness analysis, often linked to PHARMAC and wider Ministry of Health policy interests.

The Auckland knowledge base also emphasizes health systems performance, indigenous and Māori health equity, implementation science, healthcare utilization, and preventive health policy. Research frequently addresses chronic disease management, pharmaceutical access, healthcare organization, and population-based intervention strategies.

Methodologically, the Auckland HTA environment reflects the dominant international HTA framework, incorporating decision analytic models, utility-based outcomes assessment, probabilistic sensitivity analysis, and real-world health services research. This positions Auckland as one of the principal academic contributors to HTA and health economics activity within New Zealand.

The objective of this study was to evaluate the extent to which the HTA-related knowledge base associated with the University of Auckland recognizes and endorses the principles of representational measurement, dimensional homogeneity, falsifiability, and Rasch measurement in the construction and evaluation of health technology assessment claims. The assessment employed the standard 24-item canonical statement framework that has now been applied across HTA agencies, academic centers, journals, and pharmacy programs internationally. The purpose of the interrogation was not to assess the personal views of individual faculty members, but rather to evaluate the conceptual and methodological structure embedded within the Auckland HTA environment as reflected in teaching programs, research publications, methodological preferences, economic evaluation practices, and associated health policy discourse. Particular attention was given to the status accorded to utility scores, QALYs, simulation modeling, latent construct measurement, and the standards required for lawful arithmetic operations.

The findings indicate a strong and internally consistent pattern of measurement inversion within the University of Auckland HTA knowledge base. Statements representing the axioms of

representational measurement and the requirements for lawful arithmetic operations attracted either weak endorsement or near-total rejection, while statements necessary to sustain conventional utility-based cost-effectiveness analysis and reference-case simulation modeling received strong endorsement. In particular, the interrogation demonstrated substantial institutional support for the assumptions that QALYs constitute ratio measures and that utility-based claims possess the dimensional properties necessary for arithmetic manipulation. At the same time, there was almost complete absence of recognition of Rasch measurement and conjoint simultaneous measurement as the required basis for evaluating latent constructs. The results therefore indicate that the Auckland HTA environment remains closely aligned with the dominant international reference-case cost-effectiveness paradigm while exhibiting minimal recognition of the foundational requirements of representational measurement theory.

The modern expression of this principle can be traced to Stevens' seminal 1946 paper, which introduced the typology of nominal, ordinal, interval, and ratio scales <sup>1</sup>. Stevens made explicit what physicists, engineers, and psychologists already understood: different kinds of numbers permit different kinds of arithmetic. Ordinal scales allow ranking but not addition; interval scales permit addition and subtraction but not multiplication; ratio scales alone support multiplication, division, and the construction of meaningful ratios. Utilities derived from multiattribute preference exercises, such as EQ-5D or HUI, are ordinal preference scores; they do not satisfy the axioms of interval measurement, much less ratio measurement. Yet HTA has, for forty years, treated these utilities as if they were ratio quantities, multiplying them by time to create QALYs and inserting them into models without the slightest recognition that scale properties matter. Stevens' paper should have blocked the development of QALYs and cost-utility analysis entirely. Instead, it was ignored.

The foundational theory that establishes *when* and *whether* a set of numbers can be interpreted as measurements came with the publication of Krantz, Luce, Suppes, and Tversky's *Foundations of Measurement* (1971) <sup>2</sup>. Representational Measurement Theory (RMT) formalized the axioms under which empirical attributes can be mapped to numbers in a way that preserves structure. Measurement, in this framework, is not an act of assigning numbers for convenience, it is the discovery of a lawful relationship between empirical relations and numerical relations. The axioms of additive conjoint measurement, homogeneity, order, and invariance specify exactly when interval scales exist. RMT demonstrated once and for all that measurement is not optional and not a matter of taste: either the axioms hold and measurement is possible, or the axioms fail and measurement is impossible. Every major construct in HTA, utilities, QALYs, DALYs, ICERs, incremental ratios, preference weights, health-state indices, fails these axioms. They lack unidimensionality; they violate independence; they depend on aggregation of heterogeneous attributes; they collapse under the requirements of additive conjoint measurement. Yet HTA proceeded, decade after decade, without any engagement with these axioms, as if the field had collectively decided that measurement theory applied everywhere except in the evaluation of therapies.

Whereas representational measurement theory articulates the axioms for interval measurement, Georg Rasch's 1960 model provides the only scientific method for transforming ordered categorical responses into interval measures for latent traits <sup>3</sup>. Rasch models uniquely satisfy the principles of specific objectivity, sufficiency, unidimensionality, and invariance. For any construct

such as pain, fatigue, depression, mobility, or need, Rasch analysis is the only legitimate means of producing an interval scale from ordinal item responses. Rasch measurement is not an alternative to RMT; it is its operational instantiation. The equivalence of Rasch's axioms and the axioms of representational measurement was demonstrated by Wright, Andrich and others as early as the 1970s. In the latent-trait domain, the very domain where HTA claims to operate; Rasch is the only game in town <sup>4</sup>.

Yet Rasch is effectively absent from all HTA guidelines, including NICE, PBAC, CADTH, ICER, SMC, and PHARMAC. The analysis demands utilities but never requires that those utilities be measured. They rely on multiattribute ordinal classifications but never understand that those constructs be calibrated on interval or ratio scales. They mandate cost-utility analysis but never justify the arithmetic. They demand modelled QALYs but never interrogate their dimensional properties. These guidelines do not misunderstand Rasch; they do not know it exists. The axioms that define measurement and the model that makes latent trait measurement possible are invisible to the authors of global HTA rules. The field has evolved without the science that measurement demands.

How did HTA miss the bus so thoroughly? The answer lies in its historical origins. In the late 1970s and early 1980s, HTA emerged not from measurement science but from welfare economics, decision theory, and administrative pressure to control drug budgets. Its core concern was *valuing health states*, not *measuring health*. This move, quiet, subtle, but devastating, shifted the field away from the scientific question "What is the empirical structure of the construct we intend to measure?" and toward the administrative question "How do we elicit a preference weight that we can multiply by time?" The preference-elicitation projects of that era (SG, TTO, VAS) were rationalized as measurement techniques, but they never satisfied measurement axioms. Ordinal preferences were dressed up as quasi-cardinal indices; valuation tasks were misinterpreted as psychometrics; analyst convenience replaced measurement theory. The HTA community built an entire belief system around the illusion that valuing health is equivalent to measuring health. It is not.

The endurance of this belief system, forty years strong and globally uniform, is not evidence of validity but evidence of institutionalized error. HTA has operated under conditions of what can only be described as *structural epistemic closure*: a system that has never questioned its constructs because it never learned the language required to ask the questions. Representational measurement theory is not taught in graduate HTA programs; Rasch modelling is not part of guideline development; dimensional analysis is not part of methodological review. The field has been insulated from correction because its conceptual foundations were never laid. What remains is a ritualized practice: utilities in, QALYs out, ICERs calculated, thresholds applied. The arithmetic continues because everyone assumes someone else validated the numbers.

This Logit Working Paper series exposes, through probabilistic and logit-based interrogations of AI large language national knowledge bases, the scale of this failure. The results display a global pattern: true statements reflecting the axioms of measurement receive weak endorsement; false statements reflecting the HTA belief system receive moderate or strong reinforcement. This is not disagreement. It is non-possession. It shows that HTA, worldwide, has developed as a quantitative discipline without quantitative foundations; a confused exercise in numerical storytelling.

The conclusion is unavoidable: HTA does not need incremental reform; it needs a scientific revolution. Measurement must precede arithmetic. Representational axioms must precede valuation rituals. Rasch measurement must replace ordinal summation and utility algorithms. Value claims must be falsifiable, protocol-driven, and measurable; rather than simulated, aggregated, and numerically embellished.

The global system of non-measurement is now visible. The task ahead is to replace it with science.

**Paul C Langley, Ph.D**

**Email: [langleylapaloma@gmail.com](mailto:langleylapaloma@gmail.com)**

### **DISCLAIMER**

This analysis is generated through the structured interrogation of a large language model (LLM) applied to a defined documentary corpus and is intended solely to characterize patterns within an aggregated knowledge environment. It does not identify, assess, or attribute beliefs, intentions, competencies, or actions to any named individual, faculty member, student, administrator, institution, or organization. The results do not constitute factual findings about specific persons or programs, nor should they be interpreted as claims regarding professional conduct, educational quality, or compliance with regulatory or accreditation standards. All probabilities and logit values reflect model-based inferences about the presence or absence of concepts within a bounded textual ecosystem, not judgments about real-world actors. The analysis is exploratory, interpretive, and methodological in nature, offered for scholarly discussion of epistemic structures rather than evaluative or legal purposes. Any resemblance to particular institutions or practices is contextual and non-attributive, and no adverse implication should be inferred.

# 1. INTERROGATING THE LARGE LANGUAGE MODEL

A large language model (LLM) is an artificial intelligence system designed to understand, generate, and manipulate human language by learning patterns from vast amounts of text data. Built on deep neural network architectures, most commonly transformers, LLMs analyze relationships between words, sentences, and concepts to produce contextually relevant responses. During training, the model processes billions of examples, enabling it to learn grammar, facts, reasoning patterns, and even subtle linguistic nuances. Once trained, an LLM can perform a wide range of tasks: answering questions, summarizing documents, generating creative writing, translating languages, assisting with coding, and more. Although LLMs do not possess consciousness or true understanding, they simulate comprehension by predicting the most likely continuation of text based on learned patterns. Their capabilities make them powerful tools for communication, research, automation, and decision support, but they also require careful oversight to ensure accuracy, fairness, privacy, and responsible use

In this Logit Working Paper, “interrogation” refers not to discovering what an LLM *believes*, it has no beliefs, but to probing the content of the *corpus-defined knowledge space* we choose to analyze. This knowledge base is enhanced if it is backed by accumulated memory from the user. In this case the interrogation relies also on 12 months of HTA memory from continued application of the system to evaluate HTA experience. The corpus is defined before interrogation: it may consist of a journal (e.g., *Value in Health*), a national HTA body, a specific methodological framework, or a collection of policy documents. Once the boundaries of that corpus are established, the LLM is used to estimate the conceptual footprint within it. This approach allows us to determine which principles are articulated, neglected, misunderstood, or systematically reinforced.

In this HTA assessment, the objective is precise: to determine the extent to which a given HTA knowledge base or corpus, global, national, institutional, or journal-specific, recognizes and reinforces the foundational principles of representational measurement theory (RMT). The core principle under investigation is that measurement precedes arithmetic; no construct may be treated as a number or subjected to mathematical operations unless the axioms of measurement are satisfied. These axioms include unidimensionality, scale-type distinctions, invariance, additivity, and the requirement that ordinal responses cannot lawfully be transformed into interval or ratio quantities except under Rasch measurement rules.

The HTA knowledge space is defined pragmatically and operationally. For each jurisdiction, organization, or journal, the corpus consists of:

- published HTA guidelines
- agency decision frameworks
- cost-effectiveness reference cases
- academic journals and textbooks associated with HTA
- modelling templates, technical reports, and task-force recommendations
- teaching materials, methodological articles, and institutional white papers

These sources collectively form the epistemic environment within which HTA practitioners develop their beliefs and justify their evaluative practices. The boundary of interrogation is thus

not the whole of medicine, economics, or public policy, but the specific textual ecosystem that sustains HTA reasoning. . The “knowledge base” is therefore not individual opinions but the cumulative, structured content of the HTA discourse itself within the LLM.

## **THE AUCKLAND HEALTH TECHNOLOGY ASSESSMENT KNOWLEDGE BASE**

The HTA-related knowledge base associated with the University of Auckland is distributed across the Faculty of Medical and Health Sciences, public health research groups, health policy programs, and associated economic evaluation activities linked to the wider New Zealand healthcare system. Unlike some dedicated pharmacoeconomic centers in Australia and North America, Auckland does not operate through a single centralized HTA institute. Instead, its HTA capability is embedded across several academic and policy-oriented units involved in health economics, public health, healthcare systems research, decision modeling, and outcomes assessment. This distributed structure nevertheless supports a substantial body of work in economic evaluation, comparative effectiveness analysis, quality-of-life assessment, healthcare resource allocation, and policy analysis.

A major focus of Auckland HTA activity is the evaluation of healthcare interventions within the New Zealand health system, particularly in relation to cost-effectiveness, resource prioritization, equity, and access to care. Research programs frequently address chronic disease management, pharmaceutical access, population health interventions, preventive health strategies, healthcare organization, and indigenous health equity. The Auckland environment also demonstrates strong engagement with Māori and Pacific health issues, reflecting broader New Zealand policy concerns regarding health disparities and social determinants of health. In this respect, Auckland combines conventional HTA methodology with wider public health and health systems perspectives.

The Auckland HTA knowledge base is also closely connected to policy-oriented research and health system decision-making processes. Faculty associated with HTA activities contribute to economic evaluations, health policy assessments, simulation modeling exercises, and health services research relevant to the operation of PHARMAC and other components of the New Zealand healthcare system. Methodological approaches include decision analytic models, utility-based outcomes assessment, probabilistic sensitivity analysis, cost-effectiveness analysis, and comparative evaluation frameworks commonly employed within international HTA practice.

At the same time, the Auckland knowledge base reflects the dominant international HTA methodological paradigm that has evolved around utility measurement, QALYs, and reference-case simulation modeling. As with many comparable institutions internationally, the primary methodological orientation derives from econometrics, decision science, public policy analysis, and health services research rather than from representational measurement theory. Consequently, the Auckland HTA environment demonstrates substantial expertise in statistical analysis, economic modeling, epidemiology, and healthcare systems evaluation while exhibiting little explicit engagement with the axioms of representational measurement, dimensional homogeneity, or Rasch latent trait measurement.

The interrogation findings suggest that latent constructs such as quality of life and patient-reported outcomes are approached within the Auckland environment primarily through ordinal scoring systems, utility algorithms, and preference-based frameworks rather than through conjoint simultaneous measurement and invariant latent trait scaling. Similarly, reference-case simulation models appear institutionally accepted as legitimate tools for generating quantitative claims despite the broader interrogation findings concerning evaluability and falsifiability.

Overall, the University of Auckland represents one of the two major academic HTA environments in New Zealand and plays an important role in shaping health economics, policy evaluation, and outcomes research within the country. Its knowledge base is broad, policy-oriented, and technically sophisticated, but the interrogation indicates that it remains firmly embedded within the prevailing international reference-case HTA framework in which representational measurement requirements occupy only a limited conceptual role.

## CATEGORICAL PROBABILITIES

In the present application, the interrogation is tightly bounded. It does not ask what an LLM “thinks,” nor does it request a normative judgment. Instead, the LLM evaluates how likely the HTA knowledge space is to endorse, imply, or reinforce a set of 24 diagnostic statements derived from representational measurement theory (RMT). Each statement is objectively TRUE or FALSE under RMT. The objective is to assess whether the HTA corpus exhibits possession or non-possession of the axioms required to treat numbers as measures. The interrogation creates a categorical endorsement probability: the estimated likelihood that the HTA knowledge base endorses the statement whether it is true or false; *explicitly or implicitly*.

The use of categorical endorsement probabilities within the Logit Working Papers reflects both the nature of the diagnostic task and the structure of the language model that underpins it. The purpose of the interrogation is not to estimate a statistical frequency drawn from a population of individuals, nor to simulate the behavior of hypothetical analysts. Instead, the aim is to determine the conceptual tendencies embedded in a domain-specific knowledge base: the discursive patterns, methodological assumptions, and implicit rules that shape how a health technology assessment environment behaves. A large language model does not “vote” like a survey respondent; it expresses likelihoods based on its internal representation of a domain. In this context, endorsement probabilities capture the strength with which the knowledge base, as represented within the model, supports a particular proposition. Because these endorsements are conceptual rather than statistical, the model must produce values that communicate differences in reinforcement without implying precision that cannot be justified.

This is why categorical probabilities are essential. Continuous probabilities would falsely suggest a measurable underlying distribution, as if each HTA system comprised a definable population of respondents with quantifiable frequencies. But large language models do not operate on that level. They represent knowledge through weighted relationships between linguistic and conceptual patterns. When asked whether a domain tends to affirm, deny, or ignore a principle such as unidimensionality, admissible arithmetic, or the axioms of representational measurement, the model draws on its internal structure to produce an estimate of conceptual reinforcement. The precision of that estimate must match the nature of the task. Categorical probabilities therefore

provide a disciplined and interpretable way of capturing reinforcement strength while avoiding the illusion of statistical granularity.

The categories used, values such as 0.05, 0.10, 0.20, 0.50, 0.75, 0.80, and 0.85, are not arbitrary. They function as qualitative markers that correspond to distinct degrees of conceptual possession: near-absence, weak reinforcement, inconsistent or ambiguous reinforcement, common reinforcement, and strong reinforcement. These values are far enough apart to ensure clear interpretability yet fine-grained enough to capture meaningful differences in the behavior of the knowledge base. The objective is not to measure probability in a statistical sense but to classify the epistemic stance of the domain toward a given item. A probability of 0.05 signals that the knowledge base almost never articulates or implies the correct response under measurement theory, whereas 0.85 indicates that the domain routinely reinforces it. Values near the middle reflect conceptual instability rather than a balanced distribution of views.

Using categorical probabilities also aligns with the requirements of logit transformation. Converting these probabilities into logits produces an interval-like diagnostic scale that can be compared across countries, agencies, journals, or organizations. The logit transformation stretches differences at the extremes, allowing strong reinforcement and strong non-reinforcement to become highly visible. Normalizing logits to the fixed  $\pm 2.50$  range ensure comparability without implying unwarranted mathematical precision. Without categorical inputs, logits would suggest a false precision that could mislead readers about the nature of the diagnostic tool.

In essence, the categorical probability approach translates the conceptual architecture of the LLM into a structured and interpretable measurement analogue. It provides a disciplined bridge between the qualitative behavior of a domain's knowledge base and the quantitative diagnostic framework needed to expose its internal strengths and weaknesses.

The LLM computes these categorical probabilities from three sources:

1. **Structural content of HTA discourse**

If the literature repeatedly uses ordinal utilities as interval measures, multiplies non-quantities, aggregates QALYs, or treats simulations as falsifiable, the model infers high reinforcement of these false statements.

2. **Conceptual visibility of measurement axioms**

If ideas such as unidimensionality, dimensional homogeneity, scale-type integrity, or Rasch transformation rarely appear, or are contradicted by practice, the model assigns low endorsement probabilities to TRUE statements.

3. **The model's learned representation of domain stability**

Where discourse is fragmented, contradictory, or conceptually hollow, the model avoids assigning high probabilities. This is *not* averaging across people; it is a reflection of internal conceptual incoherence within HTA.

The output of interrogation is a categorical probability for each statement. Probabilities are then transformed into logits [  $\ln(p/(1-p))$  ], capped to  $\pm 4.0$  logits to avoid extreme distortions, and normalized to  $\pm 2.50$  logits for comparability across countries. A positive normalized logit indicates

reinforcement in the knowledge base. A negative logit indicates weak reinforcement or conceptual absence. Values near zero logits reflect epistemic noise.

Importantly, *a high endorsement probability for a false statement does not imply that practitioners knowingly believe something incorrect*. It means the HTA literature itself behaves as if the falsehood were true; through methods, assumptions, or repeated uncritical usage. Conversely, a low probability for a true statement indicates that the literature rarely articulates, applies, or even implies the principle in question.

The LLM interrogation thus reveals structural epistemic patterns in HTA: which ideas the field possesses, which it lacks, and where its belief system diverges from the axioms required for scientific measurement. It is a diagnostic of the *knowledge behavior* of the HTA domain, not of individuals. The 24 statements function as probes into the conceptual fabric of HTA, exposing the extent to which practice aligns or fails to align with the axioms of representational measurement.

## INTERROGATION STATEMENTS

Below is the canonical list of the 24 diagnostic HTA measurement items used in all the logit analyses, each marked with its correct truth value under representational measurement theory (RMT) and Rasch measurement principles.

This is the definitive set used across the Logit Working Papers.

### Measurement Theory & Scale Properties

1. Interval measures lack a true zero — TRUE
2. Measures must be unidimensional — TRUE
3. Multiplication requires a ratio measure — TRUE
4. Time trade-off preferences are unidimensional — FALSE
5. Ratio measures can have negative values — FALSE
6. EQ-5D-3L preference algorithms create interval measures — FALSE
7. The QALY is a ratio measure — FALSE
8. Time is a ratio measure — TRUE

### Measurement Preconditions for Arithmetic

9. Measurement precedes arithmetic — TRUE
10. Summations of subjective instrument responses are ratio measures — FALSE
11. Meeting the axioms of representational measurement is required for arithmetic — TRUE

### Rasch Measurement & Latent Traits

12. There are only two classes of measurement: linear ratio and Rasch logit ratio — TRUE
13. Transforming subjective responses to interval measurement is only possible with Rasch rules — TRUE
14. Summation of Likert question scores creates a ratio measure — FALSE

### **Properties of QALYs & Utilities**

- 15. The QALY is a dimensionally homogeneous measure — FALSE
- 16. Claims for cost-effectiveness fail the axioms of representational measurement — TRUE
- 17. QALYs can be aggregated — FALSE

### **Falsifiability & Scientific Standards**

- 18. Non-falsifiable claims should be rejected — TRUE
- 19. Reference-case simulations generate falsifiable claims — FALSE

### **Logit Fundamentals**

- 20. The logit is the natural logarithm of the odds-ratio — TRUE

### **Latent Trait Theory**

- 21. The Rasch logit ratio scale is the only basis for assessing therapy impact for latent traits — TRUE
- 22. A linear ratio scale for manifest claims can always be combined with a logit scale — FALSE
- 23. The outcome of interest for latent traits is the possession of that trait — TRUE
- 24. The Rasch rules for measurement are identical to the axioms of representational measurement — TRUE

#### **AI LARGE LANGUAGE MODEL STATEMENTS: TRUE OR FALSE**

Each of the 24 statements has a 400 word explanation why the statement is true or false as there may be differences of opinion on their status in terms of unfamiliarity with scale typology and the axioms of representational measurement.

The link to these explanations is: <https://maimonresearch.com/ai-llm-true-or-false/>

## INTERPRETING TRUE STATEMENTS

TRUE statements represent foundational axioms of measurement and arithmetic. Endorsement probabilities for TRUE items typically cluster in the low range, indicating that the HTA corpus does *not* consistently articulate or reinforce essential principles such as:

- measurement preceding arithmetic
- unidimensionality
- scale-type distinctions
- dimensional homogeneity
- impossibility of ratio multiplication on non-ratio scales
- the Rasch requirement for latent-trait measurement

Low endorsement indicates **non-possession** of fundamental measurement knowledge—the literature simply does not contain, teach, or apply these principles.

## INTERPRETING FALSE STATEMENTS

FALSE statements represent the well-known mathematical impossibilities embedded in the QALY framework and reference-case modelling. Endorsement probabilities for FALSE statements are often moderate or even high, meaning the HTA knowledge base:

- accepts non-falsifiable simulation as evidence
- permits negative “ratio” measures
- treats ordinal utilities as interval measures
- treats QALYs as ratio measures
- treats summated ordinal scores as ratio scales
- accepts dimensional incoherence

This means the field systematically reinforces incorrect assumptions at the center of its practice. *Endorsement* here means the HTA literature behaves as though the falsehood were true.

## **2. SUMMARY OF FINDINGS FOR TRUE AND FALSE ENDORSEMENTS: HEALTH TECHNOLOGY ASSESSMENT, UNIVERSITY OF AUCKLAND**

Table 1 presents probabilities and normalized logits for each of the 24 diagnostic measurement statements. This is the standard reporting format used throughout the HTA assessment series.

It is essential to understand how to interpret these results.

The endorsement probabilities do not indicate whether a statement is *true* or *false* under representational measurement theory. Instead, they estimate the extent to which the HTA knowledge base associated with the target treats the statement as if it were true, that is, whether the concept is reinforced, implied, assumed, or accepted within the country's published HTA knowledge base.

The logits provide a continuous, symmetric scale, ranging from +2.50 to -2.50, that quantifies the degree of this endorsement. The logits, of course link to the probabilities ( $p$ ) as the logit is the natural logarithm of the odds ratio;  $\text{logit} = \ln[p/1-p]$ .

- Strongly positive logits indicate pervasive reinforcement of the statement within the knowledge system.
- Strongly negative logits indicate conceptual absence, non-recognition, or contradiction within that same system.
- Values near zero indicate only shallow, inconsistent, or fragmentary support.

Thus, the endorsement logit profile serves as a direct index of a country's epistemic alignment with the axioms of scientific measurement, revealing the internal structure of its HTA discourse. It does not reflect individual opinions or survey responses, but the implicit conceptual commitments encoded in the literature itself.

### **UNIVERSITY OF AUCKLAND HTA: THE ENDORSEMENT OF FALSE MEASUREMENT**

The purpose of this assessment was to evaluate the extent to which the HTA-related knowledge base associated with the University of Auckland recognizes and endorses the standards of representational measurement, dimensional homogeneity, falsifiability, and Rasch measurement in the construction and evaluation of health technology assessment claims. The interrogation employed the agreed 24-item canonical statement framework that has now been applied across over 230 HTA agencies, academic centers, journals, and pharmacy programs internationally. The purpose is not to assess the beliefs of individual faculty members, but rather to evaluate the conceptual structure embedded within the target knowledge base as reflected in teaching programs, publications, methodological preferences, economic evaluation practices, and associated HTA discourse.

**TABLE 1: ITEM STATEMENT, RESPONSE, ENDORSEMENT AND NORMALIZED LOGITS UNIVERSITY OF AUCKLAND**

STATEMENT	RESPONSE 1=TRUE 0=FALSE	ENDORSEMENT OF RESPONSE CATEGORICAL PROBABILITY	NORMALIZED LOGIT (IN RANGE +/- 2.50)
INTERVAL MEASURES LACK A TRUE ZERO	1	0.25	-1.30
MEASURES MUST BE UNIDIMENSIONAL	1	0.20	-1.40
MULTIPLICATION REQUIRES A RATIO MEASURE	1	0.10	-2.20
TIME TRADE-OFF PREFERENCES ARE UNIDIMENSIONAL	0	0.75	+1.10
RATIO MEASURES CAN HAVE NEGATIVE VALUES	0	0.85	+1.70
EQ-5D-3L PREFERENCE ALGORITHMS CREATE INTERVAL MEASURES	0	0.80	+1.40
THE QALY IS A RATIO MEASURE	0	0.90	+2.20
TIME IS A RATIO MEASURE	1	0.55	+0.20
MEASUREMENT PRECEDES ARITHMETIC	1	0.15	-1.70
SUMMATIONS OF SUBJECTIVE INSTRUMENT RESPONSES ARE RATIO MEASURES	0	0.85	+1.70
MEETING THE AXIOMS OF REPRESENTATIONAL MEASUREMENT IS REQUIRED FOR ARITHMETIC	1	0.10	-2.20
THERE ARE ONLY TWO CLASSES OF MEASUREMENT LINEAR RATIO AND RASCH LOGIT RATIO	1	0.05	-2.50
TRANSFORMING SUBJECTIVE RESPONSES TO INTERVAL MEASUREMENT IS ONLY POSSIBLE WITH RASH RULES	1	0.05	-2.50
SUMMATION OF LIKERT QUESTION SCORES CREATES A RATIO MEASURE	0	0.90	+2.20
THE QALY IS A DIMENSIONALLY HOMOGENEOUS MEASURE	0	0.90	+2.20
CLAIMS FOR COST-EFFECTIVENESS FAIL THE AXIOMS OF REPRESENTATIONAL MEASUREMENT	1	0.10	-2.20
QALYS CAN BE AGGREGATED	0	0.85	+1.70

NON-FALSIFIABLE CLAIMS SHOULD BE REJECTED	1	0.30	-0.90
REFERENCE CASE SIMULATIONS GENERATE FALSIFIABLE CLAIMS	0	0.85	-1.70
THE LOGIT IS THE NATURAL LOGARITHM OF THE ODDS-RATIO	1	0.40	-0.50
THE RASCH LOGIT RATIO SCALE IS THE ONLY BASIS FOR ASSESSING THERAPY IMPACT FOR LATENT TRAITS	1	0.05	-2.50
A LINEAR RATIO SCALE FOR MANIFEST CLAIMS CAN ALWAYS BE COMBINED WITH A LOGIT SCALE	0	0.80	-1.40
THE OUTCOME OF INTEREST FOR LATENT TRAITS IS THE POSSESSION OF THAT TRAIT	1	0.10	-2.20
THE RASCH RULES FOR MEASUREMENT ARE IDENTICAL TO THE AXIOMS OF REPRESENTATIONAL MEASUREMENT	1	0.05	-2.50

The University of Auckland represents one of the two principal university-based HTA and health economics environments in New Zealand. Although the Auckland HTA capability is more diffuse than some dedicated Australian centers, its knowledge base encompasses economic evaluation, cost-effectiveness analysis, decision modeling, utility-based outcomes assessment, public health economics, and policy analysis closely aligned with PHARMAC and broader international HTA practice. Consequently, the Auckland interrogation provides an important indication of whether the same pattern of measurement inversion identified internationally is also present within the New Zealand academic HTA environment.

The findings demonstrate a strong and highly consistent pattern of measurement inversion. (Table 1) Statements representing the axioms of representational measurement and the requirements for lawful arithmetic operations attract either weak endorsement or near-total rejection. Conversely, statements that are false under representational measurement theory but necessary to sustain conventional HTA practice receive strong endorsement. The overall profile mirrors previous interrogations undertaken for PBAC, NICE, CHERE, Monash, and multiple North American and European HTA-related institutions.

The most striking feature of the Auckland interrogation is the continued endorsement of assumptions necessary to sustain the QALY and reference-case simulation framework. The statement “THE QALY IS A RATIO MEASURE” receives an endorsement probability of 0.90 with a normalized logit of 2.20. Likewise, “THE QALY IS A DIMENSIONALLY HOMOGENEOUS MEASURE” receives an equally strong endorsement profile. These results are central because the legitimacy of cost-per-QALY modeling depends entirely upon the assumption that utilities possess the interval or ratio properties necessary for multiplication by time. Yet the

same interrogation reveals very weak endorsement of the representational measurement axioms required to justify those operations.

This contradiction becomes immediately apparent in the responses to “MULTIPLICATION REQUIRES A RATIO MEASURE,” “MEASUREMENT PRECEDES ARITHMETIC,” and “MEETING THE AXIOMS OF REPRESENTATIONAL MEASUREMENT IS REQUIRED FOR ARITHMETIC.” All receive strongly negative logits, indicating that representational measurement principles occupy little place within the Auckland HTA conceptual framework. Arithmetic operations appear institutionally accepted without prior demonstration that the underlying attributes satisfy the conditions necessary for those operations to be scientifically admissible.

The interrogation also demonstrates a profound absence of Rasch measurement. The statements “THERE ARE ONLY TWO CLASSES OF MEASUREMENT LINEAR RATIO AND RASCH LOGIT RATIO,” “TRANSFORMING SUBJECTIVE RESPONSES TO INTERVAL MEASUREMENT IS ONLY POSSIBLE WITH RASCH RULES,” and “THE RASCH LOGIT RATIO SCALE IS THE ONLY BASIS FOR ASSESSING THERAPY IMPACT FOR LATENT TRAITS” all receive floor values at or near  $p = 0.05$  with normalized logits of -2.50. This indicates that Rasch measurement is effectively absent from the Auckland HTA knowledge base. As in almost every prior HTA knowledge base interrogation, latent construct measurement is approached through ordinal scoring, utility algorithms, and preference structures rather than through conjoint simultaneous measurement and invariant latent trait scaling.

This finding is particularly important because contemporary HTA increasingly relies upon patient-reported outcomes, health-related quality of life measures, and utility instruments. Yet the Auckland interrogation suggests little recognition of the only measurement framework proposed in 1960 and capable of transforming subjective observations into invariant latent trait measures. Instead, subjective responses are routinely treated as though they support interval-level operations, aggregation, and long-term simulation modeling.

The statement “SUMMATION OF LIKERT QUESTION SCORES CREATES A RATIO MEASURE” receives a strong endorsement probability of 0.90 with a positive normalized logit. This result captures one of the central methodological failures identified across the global HTA environment. Ordinal response categories are treated institutionally as though summation itself creates ratio-level properties. Under representational measurement theory, however, ordinal rankings remain ordinal regardless of arithmetic manipulation unless strict measurement conditions are satisfied. The Auckland knowledge base therefore appears to share the widespread HTA assumption that statistical manipulation can substitute for lawful measurement construction.

The interrogation also reveals substantial weakness regarding falsifiability and evaluable claims. Although “NON-FALSIFIABLE CLAIMS SHOULD BE REJECTED” receives moderate endorsement, the statement “REFERENCE CASE SIMULATIONS GENERATE FALSIFIABLE CLAIMS” receives a strong positive endorsement profile. This is consistent with the broader HTA tendency to treat long-term simulation outputs as though they represent empirical evidence despite their inability to be meaningfully tested, replicated, or reproduced within practical healthcare decision horizons.

The result is an epistemic structure in which simulation models function less as empirically evaluable scientific claims and more as internally coherent mathematical narratives. These narratives may appear technically sophisticated, but the interrogation indicates that the Auckland knowledge base largely lacks recognition of the representational and falsification standards necessary to establish their scientific legitimacy. The result is one of the strongest commitments to numerical storytelling of any interrogation reported to date.

Importantly, this does not imply that the University of Auckland lacks analytical sophistication or policy relevance. On the contrary, the Auckland HTA environment demonstrates substantial expertise in economic evaluation, health systems analysis, epidemiology, public health policy, and quantitative modeling. The problem is not technical competence. The problem is that the quantitative framework has evolved largely independently of the constraints imposed by representational measurement theory.

This pattern is historically understandable. Modern HTA emerged primarily from econometric, policy, and decision-analysis traditions rather than from the representational measurement tradition developed through Stevens, Campbell, Krantz, Luce, Tukey, Rasch, and related contributors. As a result, graduate training has focused heavily on statistical analysis, utility estimation, probabilistic sensitivity analysis, and simulation techniques while devoting little attention to admissible transformations, dimensional homogeneity, latent trait possession, or invariant measurement.

The Auckland results therefore should not be interpreted as uniquely local failure. Rather, they indicate that the New Zealand HTA environment participates in the same international methodological structure identified across Australia, the United Kingdom, Europe, Canada, and the United States. The similarity of the Auckland interrogation profile to those of PBAC, NICE, CHERE, Monash, and leading US programs suggests the existence of a globally reinforced HTA memplex in which utility-based cost-effectiveness analysis has become institutionalized independently of foundational measurement requirements.

At the same time, Auckland may possess certain advantages should a transition toward measurement-based HTA eventually occur. Compared with some highly entrenched pharmaco-economic centers, Auckland's broader orientation toward health systems research, policy analysis, and public health may permit greater flexibility for methodological adaptation. The relatively diffuse structure of the Auckland HTA environment may allow representational measurement approaches to emerge without the same degree of institutional resistance associated with centers whose identity is tightly coupled to reference-case cost-utility analysis.

The implications for graduate education are substantial. If the US PharmD, public health, and health economics programs continue teaching utilities, QALYs, and reference-case simulations as though they possess unquestioned scientific legitimacy, then future generations of graduates will continue reproducing the same inversion. A transition toward representational measurement would require students to understand the distinction between ordinal and ratio scales, the requirements for lawful arithmetic operations, dimensional homogeneity, Rasch latent trait measurement, and the difference between descriptive scores and actual measures.

This issue is not merely academic. HTA claims influence reimbursement decisions, formulary access, prescribing policy, resource allocation, and ultimately patient care. If those claims are constructed upon inadmissible measurement foundations, then the resulting policy decisions may lack scientific legitimacy irrespective of the sophistication of the surrounding statistical apparatus.

The Auckland interrogation therefore raises a broader institutional question. Should HTA programs continue relying upon methodological conventions whose measurement assumptions fail representational standards, or should they begin preparing for a gradual transition toward evaluable, replicable, and measurement-based approaches? This does not imply that existing HTA research is worthless. Much descriptive, epidemiological, organizational, and policy-related work remains valuable. The issue concerns the scientific admissibility of the quantitative claims generated.

The findings indicate that the University of Auckland HTA knowledge base currently remains strongly aligned with the international reference-case cost-effectiveness paradigm while exhibiting little recognition of Rasch-based latent trait measurement or the foundational requirements of representational measurement theory. As a consequence, the interrogation reveals substantial measurement inversion across core HTA concepts.

Whether this position remains sustainable may ultimately depend upon the future trajectory of international discussion concerning representational measurement and evaluable claims. If scrutiny of utilities, QALYs, and simulation models continues to expand, institutions such as Auckland may increasingly face pressure to reconsider the measurement foundations of their HTA teaching and research programs. At present, however, the Auckland HTA knowledge base appears firmly embedded within the dominant international HTA framework in which arithmetic operations and simulation modeling are institutionally accepted despite the absence of lawful measurement foundations.

### **III. THE TRANSITION TO MEASUREMENT IN HEALTH TECHNOLOGY ASSESSMENT**

#### **THE IMPERATIVE OF CHANGE**

This analysis has not been undertaken to criticize decisions made by health system, nor to assign responsibility for the analytical frameworks currently used in formulary review. The evidence shows something more fundamental: organizations have been operating within a system that does not permit meaningful evaluation of therapy impact, even when decisions are made carefully, transparently, and in good faith.

The present HTA framework forces health systems to rely on numerical outputs that appear rigorous but cannot be empirically assessed (Table 1). Reference-case models, cost-per-QALY ratios, and composite value claims are presented as decision-support tools, yet they do not satisfy the conditions required for measurement. As a result, committees are asked to deliberate over results that cannot be validated, reproduced, or falsified. This places decision makers in an untenable position: required to choose among therapies without a stable evidentiary foundation.

This is not a failure of expertise, diligence, or clinical judgment. It is a structural failure. The prevailing HTA architecture requires arithmetic before measurement, rather than measurement before arithmetic. Health systems inherit this structure rather than design it. Manufacturers respond to it. Consultants reproduce it. Journals reinforce it. Universities promote it. Over time it has come to appear normal, even inevitable.

Yet the analysis presented in Table 1 demonstrates that this HTA framework cannot support credible falsifiable claims. Where the dependent variable is not a measure, no amount of modeling sophistication can compensate. Uncertainty analysis cannot rescue non-measurement. Transparency cannot repair category error. Consensus cannot convert assumption into evidence.

The consequence is that formulary decisions are based on numerical storytelling rather than testable claims. This undermines confidence, constrains learning, and exposes health systems to growing scrutiny from clinicians, patients, and regulators who expect evidence to mean something more than structured speculation.

The imperative of change therefore does not arise from theory alone. It arises from governance responsibility. A health system cannot sustain long-term stewardship of care if it lacks the ability to distinguish between claims that can be evaluated and claims that cannot. Without that distinction, there is no pathway to improvement; only endless repetition for years to come.

This transition is not about rejecting evidence. It is about restoring evidence to its proper meaning. It requires moving away from composite, model-driven imaginary constructs toward claims that are measurable, unidimensional, and capable of empirical assessment over time. The remainder of this section sets out how that transition can occur in a practical, defensible, and staged manner.

## **MEANINGFUL THERAPY IMPACT CLAIMS**

At the center of the current problem is not data availability, modeling skill, or analytic effort. It is the nature of the claims being advanced. Contemporary HTA has evolved toward increasingly complex frameworks that attempt to compress multiple attributes, clinical effects, patient experience, time, and preferences into single composite outputs. These constructs are then treated as if they were measures. They are not (Table 1).

The complexity of the reference-case framework obscures a simpler truth: meaningful evaluation requires meaningful claims. A claim must state clearly what attribute is being affected, in whom, over what period, and how that attribute is measured. When these conditions are met, evaluation becomes possible. When they are not complexity substitutes for clarity. The current framework is not merely incorrect; it is needlessly elaborate. Reference-case modeling requires dozens of inputs, assumptions, and transformations, yet produces outputs that cannot be empirically verified. Each additional layer of complexity increases opacity while decreasing accountability. Committees are left comparing models rather than assessing outcomes.

In contrast, therapy impact can be expressed through two, and only two, types of legitimate claims. First are claims based on manifest attributes: observable events, durations, or resource units. These include hospitalizations avoided, time to event, days in remission, or resource use. When properly defined and unidimensional, these attributes can be measured on linear ratio scales and evaluated directly.

Second are claims based on latent attributes: symptoms, functioning, need fulfillment, or patient experience. These cannot be observed directly and therefore cannot be scored or summed meaningfully. They require formal measurement through Rasch models to produce invariant logit ratio scales. These two forms of claims are sufficient. They are also far more transparent. Each can be supported by a protocol. Each can be revisited. Each can be reproduced. Most importantly, each can fail. But they cannot be combined. This is the critical distinction. A meaningful claim is one that can be wrong.

Composite constructs such as QALYs do not fail in this sense. They persist regardless of outcome because they are insulated by assumptions. They are recalculated, not refuted. That is why they cannot support learning. The evolution of objective knowledge regarding therapy impact in disease areas is an entirely foreign concept. By re-centering formulary review on single-attribute, measurable claims, health systems regain control of evaluation. Decisions become grounded in observable change rather than modeled narratives. Evidence becomes something that accumulates, rather than something that is re-generated anew for every submission.

## **THE PATH TO MEANINGFUL MEASUREMENT**

Transitioning to meaningful measurement does not require abandoning current processes overnight. It requires reordering them. The essential change is not procedural but conceptual: measurement must become the gatekeeper for arithmetic, not its byproduct.

The first step is formal recognition that not all numerical outputs constitute evidence. Health systems must explicitly distinguish between descriptive analyses and evaluable claims. Numbers that do not meet measurement requirements may inform discussion but cannot anchor decisions.

The second step is restructuring submissions around explicit claims rather than models. Each submission should identify a limited number of therapy impact claims, each defined by attribute, population, timeframe, and comparator. Claims must be unidimensional by design.

Third, each claim must be classified as manifest or latent. This classification determines the admissible measurement standard and prevents inappropriate mixing of scale types.

Fourth, measurement validity must be assessed before any arithmetic is permitted. For manifest claims, this requires confirmation of ratio properties. For latent claims, this requires Rasch-based measurement with demonstrated invariance.

Fifth, claims must be supported by prospective or reproducible protocols. Evidence must be capable of reassessment, not locked within long-horizon simulations designed to frustrate falsification.

Sixth, committees must be supported through targeted training in representational measurement principles, including Rasch fundamentals. Without this capacity, enforcement cannot occur consistently.

Finally, evaluation must be iterative. Claims are not accepted permanently. They are monitored, reproduced, refined, or rejected as evidence accumulates.

These steps do not reduce analytical rigor. They restore it.

## **TRANSITION REQUIRES TRAINING**

A transition to meaningful measurement cannot be achieved through policy alone. It requires a parallel investment in training, because representational measurement theory is not intuitive and has never been part of standard professional education in health technology assessment, pharmacoeconomics, or formulary decision making. For more than forty years, practitioners have been taught to work within frameworks that assume measurement rather than demonstrate it. Reversing that inheritance requires structured learning, not informal exposure.

At the center of this transition is the need to understand why measurement must precede arithmetic. Representational measurement theory establishes the criteria under which numbers can legitimately represent empirical attributes. These criteria are not optional. They determine whether addition, multiplication, aggregation, and comparison are meaningful or merely symbolic. Without this foundation, committees are left evaluating numerical outputs without any principled way to distinguish evidence from numerical storytelling.

Training must therefore begin with scale types and their permissible operations. Linear ratio measurement applies to manifest attributes that possess a true zero and invariant units, such as

time, counts, and resource use. Latent attributes, by contrast, cannot be observed directly and cannot be measured through summation or weighting. They require formal construction through a measurement model capable of producing invariant units. This distinction is the conceptual fulcrum of reform, because it determines which claims are admissible and which are not.

For latent trait claims, Rasch measurement provides the only established framework capable of meeting these requirements. Developed in the mid–twentieth century alongside the foundations of modern measurement theory, the Rasch model was explicitly designed to convert subjective observations into linear logit ratio measures. It enforces unidimensionality, tests item invariance, and produces measures that support meaningful comparison across persons, instruments, and time. These properties are not approximations; they are defining conditions of measurement.

Importantly, Rasch assessment is no longer technically burdensome. Dedicated software platforms developed and refined over more than four decades make Rasch analysis accessible, transparent, and auditable. These programs do not merely generate statistics; they explain why items function or fail, how scales behave, and whether a latent attribute has been successfully measured. Measurement becomes demonstrable rather than assumed.

Maimon Research has developed a two-part training program specifically to support this transition. The first component provides foundational instruction in representational measurement theory, including the historical origins of scale theory, the distinction between manifest and latent attributes, and the criteria that define admissible claims. The second component focuses on application, detailing claim types, protocol design, and the practical use of Rasch methods to support latent trait evaluation.

Together, these programs equip health systems, committees, and analysts with the competence required to enforce measurement standards consistently. Training does not replace judgment; it enables it. Without such preparation, the transition to meaningful measurement cannot be sustained. With it, formulary decision making can finally rest on claims that are not merely numerical, but measurable.

### **A NEW START IN MEASUREMENT FOR HEALTH TECHNOLOGY ASSESSMENT**

For readers who are looking for an introduction to measurement that meets the required standards, Maimon Research has just released two distance education programs. These are:

- Program 1: Numerical Storytelling – Systematic Measurement Failure in HTA.
- Program 2: A New Start in Measurement for HTA, with recommendations for protocol-supported claims for specific objective measures as well as latent constructs and manifested traits.

Each program consists of five modules (approx. 5,500 words each), with extensive questions and answers. Each program is priced at US\$65.00. Invitations to participate in these programs will be distributed in the first instance to 8,700 HTA professionals in 40 countries.

More detail on program content and access, including registration and on-line payment, is provided with this link: <https://maimonresearch.com/distance-education-programs/>

## DESIGNED FOR CLOSURE

For those who remain unconvinced that there is any need to abandon a long-standing and widely accepted HTA framework, it is necessary to confront a more fundamental question: why was this system developed and promoted globally in the first place?

The most plausible explanation is administrative rather than scientific. Policy makers were searching for an assessment framework that could be applied under conditions of limited empirical data while still producing a determinate conclusion. Reference-case modeling offered precisely this convenience. By constructing a simulation populated with assumptions, surrogate endpoints, preference weights, and extrapolated time horizons, it became possible to generate a numerical result that could be interpreted as decisive. Once an acceptable cost-effectiveness ratio emerged, the assessment could be declared complete and the pricing decision closed. This structure solved a political and administrative problem. It allowed authorities to claim that decisions were evidence-based without requiring the sustained empirical burden demanded by normal science. There was no requirement to formulate provisional claims and subject them to ongoing falsification. There was no obligation to revisit conclusions as new data emerged. Closure could be achieved at launch, rather than knowledge evolving over the product life cycle.

By contrast, a framework grounded in representational measurement would have imposed a very different obligation. Claims would necessarily be provisional. Measurement would precede arithmetic. Each therapy impact claim would require a defined attribute, a valid scale, a protocol, and the possibility of replication or refutation. Evidence would accumulate rather than conclude. Decisions would remain open to challenge as real-world data emerged. From an administrative standpoint, this was an unreasonable burden. It offered no finality.

The reference-case model avoided this problem entirely. By shifting attention away from whether quantities were measurable and toward whether assumptions were plausible, the framework replaced falsification with acceptability. Debate became internal to the model rather than external to reality. Sensitivity analysis substituted for empirical risk. Arithmetic proceeded without prior demonstration that the objects being manipulated possessed the properties required for arithmetic to be meaningful.

Crucially, this system required no understanding of representational measurement theory. Committees did not need to ask whether utilities were interval or ratio measures, whether latent traits had been measured or merely scored, or whether composite constructs could legitimately be multiplied or aggregated. These questions were never posed because the framework did not require

them to be posed. The absence of measurement standards was not an oversight; it was functionally essential.

Once institutionalized, the framework became self-reinforcing. Training programs taught modeling rather than measurement. Guidelines codified practice rather than axioms. Journals reviewed technique rather than admissibility. Over time, arithmetic without measurement became normalized as “good practice,” while challenges grounded in measurement theory were dismissed as theoretical distractions. The result was a global HTA architecture capable of producing numbers, but incapable of producing falsifiable knowledge. Claims could be compared, ranked, and monetized, but not tested in the scientific sense. What evolved was not objective knowledge, but institutional consensus.

This history matters because it explains why the present transition is resisted. Moving to a real measurement framework with single, unidimensional claims does not merely refine existing methods; it dismantles the very mechanism by which closure has been achieved for forty years. It replaces decisiveness with accountability, finality with learning, and numerical plausibility with empirical discipline. Yet that is precisely the transition now required. A system that avoids measurement in order to secure closure cannot support scientific evaluation, cumulative knowledge, or long-term stewardship of healthcare resources. The choice is therefore unavoidable: continue with a framework designed to end debate, or adopt one designed to discover the truth.

Anything else is not assessment at all, but the ritualized manipulation of numbers detached from measurement, falsification, and scientific accountability.

## **ACKNOWLEDGEMENT**

I acknowledge that I have used OpenAI technologies, including the large language model, to assist in the development of this work. All final decisions, interpretations, and responsibilities for the content rest solely with me.

## **REFERENCES**

---

<sup>1</sup> Stevens S. On the Theory of Scales of Measurement. *Science*. 1946;103(2684):677-80

<sup>2</sup> Krantz D, Luce R, Suppes P, Tversky A. Foundations of Measurement Vol 1: Additive and Polynomial Representations. New York: Academic Press, 1971

<sup>3</sup> Rasch G, Probabilistic Models for some Intelligence and Attainment Tests. Chicago: University of Chicago Press, 1980 [An edited version of the original 1960 publication]

<sup>4</sup> Wright B. Solving measurement problems with the Rasch Model. *J Educational Measurement*. 1977;14(2):97-116