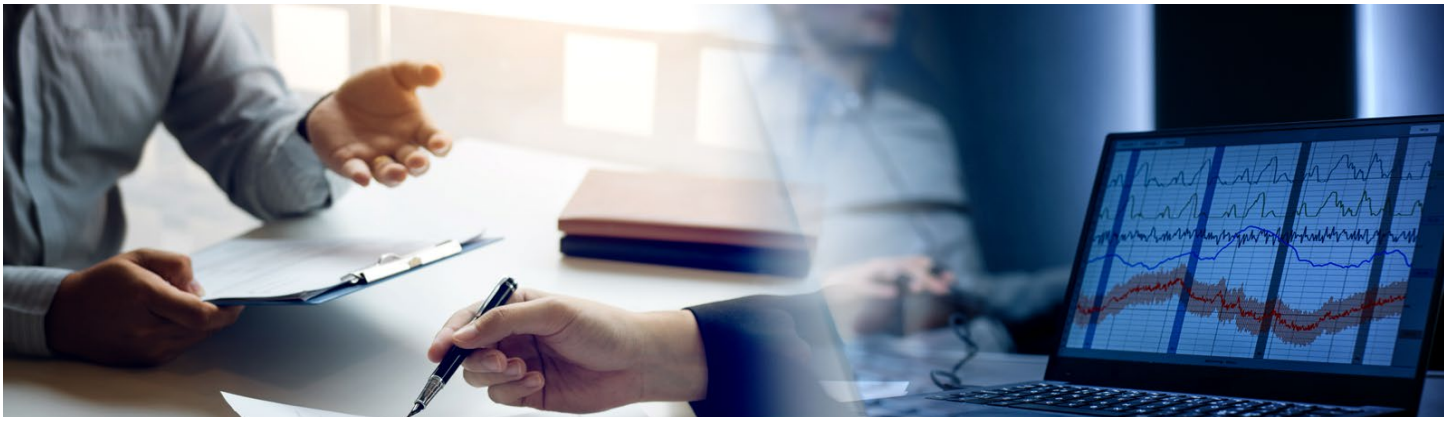

Practical Polygraph: Proposal for a Simplified Standard for In-test Annotations

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In-test annotations are standardized markings, used by polygraph professionals to document events that may occur during testing, other than the test questions and answers. Annotations have been used since the early history of the polygraph test – originally recorded manually, with a pen, in a manner similar to the way in which question onset, end, and answer locations were marked. Of course, annotations today are entered through a computer-human interface device such as a keyboard or mouse. Annotations are permanently recorded within the recorded polygraph time-series data. Polygraph data consist of the recorded time-series information, along with other information that is stored on a computer in a polygraph directory or folder.

A polygraph folder or directory contains all of the information for a polygraph test, including the time series data and other information. The information may be stored in a human readable format, or may be stored in a machine-readable (binary or compressed) format, and may also be encrypted for security. Regar dless of the storage format, a polygraph test always consists of time series data – a recording of the physiological activity of interest, along with all events that may be associated with the recorded physiological activity, and therefore of great interest later during test data analysis – along with other data such as the examinee name, date, time of testing, and other information.

Similar to in-test stimulus markings, in-test annotations provide information, about what has occurred at each moment during testing, and may also provide instruction or information that is important for correct data analysis. For example, in-test annotations may indicate when an examinee has engaged in an unexpected behavior during testing, or when the examiner provided additional instructions to an examinee. Annotations are also used when an outside stimulus occurred that may have affected data collection,

or when an error has occurred data collection or instrument operation. Annotations, like stimulus event markings, provide information about what occurred during a test.

Current computerized polygraph software allows for examiners to add annotations onto polygraph charts by either pressing keys on the keyboard or by clicking on on-screen icons. Additional information can also be added to an examination in the form of comments or notes. However, comments and notes are often stored as additional information – located within the polygraph directory or folder – though not in the time-series data. Annotations, unlike comments and notes, are included in the recorded physiological time-series data. Annotations are a permanent recording of both what has occurred and when it has occurred. This information is vital to correct understanding and analysis of the test data. Although all of this may seem somewhat obvious, it may have been more obvious and intuitive in the early decades of the polygraph profession, when the time series data and all events, including annotations, were recorded in ink on a moving scroll of paper.

Over time, the need for a standardized system of in-test annotations became apparent, and some attempt at standardization is apparent in field practice today. But the number of suggested annotations has now grown to a large and extensive list. Some polygraph software platforms may include up to 26, or more, different annotations, and these can be changed by individual users. Table 1 shows only a partial list of the variety of annotations that have been used in field practice. Other annotations have also been suggested and used.

TABLE 1. In-test annotations

Number	Annotation	Meaning	Number	Annotation	Meaning
1	T	Talking	14	CT	Clear throat
2	T-T	Talking - extended	15	SN	Sniff
3	TI	Talking instruction	16	SZ	Sneeze
4	M	Moving	17	F	Flatulence
5	MH	Moved head (moved hand)	18	B	Gastrointestinal noise
6	M-M	Movement - extended	19	OS	Other/outside stimulus
7	MI	Movement instruction	20	Z	Sleep
8	CA	Changed answer	21	Z-Z	Sleep - extended
9	AI	Answer instruction	22	WU	Wake up
10	DB	Deep breath	23	V	Void
11	BI	Breathing instruction	24	EE	Examiner error
12	EI	Examiner instruction	25	PW	Poorly worded question
13	C	Cough	26	WRQ	Will repeat question

Although possible, reliable and consistent use of a complex system of in-test annotations can require diligent training, memorization, along with ongoing review and practice. The potential for drifting and perishable operational skills can become

a concern. Although seemingly advantageous in terms of detail, the complexity of the current system of annotations can become a barrier to implementation, compliance, and test reliability.

Some field examiners today have begun to forgo the use of in-test annotations, instead providing information in the form of comments or notes. These have the apparent advantage of providing more information than a cryptic annotation, and may be completed after recording the time-series data. However, although comments and exam notes are included in the digital or computer files, they are not recorded in the time-series polygraph data. Another characteristic of notes and comments is that they can be easily removed or discarded when stripping personal or private information for anonymous review or blind data analysis. If the information is important for correct data analysis it no longer available when it is removed from the information in the polygraph directory or folder.

There are cogent arguments for the continued use of in-test annotations. However, instead of attempting to learn and use an exhaustive set of annotations, a simpler and more streamlined annotations set may provide important advantages – beginning with the development of less perishable skills among field examiners. Table 2 shows a proposed set of six categorical annotations that can address the entire range of in-test events that may influence data analysis, whether automated or manual. The proposed list of annotations does not attempt to be descriptive of all possible events that should be included in the time-series polygraph recording. Instead, this short list of annotations should be thought of as a list of annotation categories – instruction, behavior, outside stimulus, error, etc. A smaller annotation set can be more easily standardized, and more reliably implemented in field practice.

TABLE 2. Proposed in-test annotations

Annotation	Meaning
UB (U)	Unexpected behavior by the examinee
IE (I)	Instruction from the examiner
OS (O)	Outside stimulus (outside the context of the exam, whether in or outside the room)
EE (E)	Examiner error
OK (K)	Mark the properly functioning tracings for events in a functionality check
Void (V)	Mark events that are not to be analyzed, or tracings that are not functioning correctly

In practical use, most annotations will result in a binary choice at the time of data analysis – whether to use and score a segment of data, or not. This choice is necessitated when considering the analytic theory of the polygraph test – that greater changes in physiological activity are loaded at different types of test stimuli as a

function of deception or truth-telling in response to relevant target stimuli. All tests are fundamentally a matter of stimulus-and-response. Test data are usable when they are timely with the test stimuli, and when there is no other observable cause other than the test stimuli. Annotations serve to document other possible causes of observed changes in physiological activity during testing. Following the completion of data acquisition and recording, comments and notes can be used to provide more detailed information.

Compared to an exhaustive list of 26 or more descriptive annotations, this proposed set of categorical annotations offers the advantages that it can be easily learned and remembered – leading to improved standardization, increased compliance, and potentially improved reliability in test data analysis. Note how the more complete list of traditional descriptive annotations easily fits within the first four of these annotation categories.

Another limitation of the traditional, descriptive, method of in-test annotations,

UB (Unexpected Behavior by the examinee)
Belch
Cleared throat
Cough
Deep breath
Fall asleep
Laugh
Mis-answer, change or delay answer to question
Movement
Talking
Sigh
Sneeze
Sniff
Swallow
Yawn

EI (Examiner Instructions)
Answering instruction
Breathing instruction
Movement instruction
Talking instruction
Wake up

OS (Other Stimulus)
Inside noise
Outside noise

EE (Examiner Error)
Examiner error
Poorly worded question

– in addition to problems with compliance, reliability, and perishable skills – is that they are not integrated into currently available computer algorithm for the automated analysis of polygraph test data. Although computer algorithms have been shown to analyze test data as well as or better than many human scorers, there has been concern expressed about the capabilities of automated computer algorithms when presented with difficult, ugly, unstable, or artifacted test data.

Human experts, when manually scoring polygraph test data, can intelligently and creatively make use of any information provided in the polygraph directory, including annotations, comments, and examination notes. Human experts can also creatively adapt to difficult data for which an annotation should have been entered but, for a variety of possible reasons, was not. Algorithms in the future may be developed with these creative capabilities, but there are a number of practical and ethical discussions associated with this. It seems likely that automated computer algorithms may remain limited to working with the information recorded in the time-series data.

The traditional descriptive method of in-test annotations has been useful throughout the history of the polygraph profession, but has begun to present a barrier to advance and improvement. The complex list of 26 or more descriptive annotations in use today is difficult to learn and remember, and remains a perishable area of skill development. Compliance requires expensive human activity in the form of continuous practice and review. In contrast, a smaller set of six categorical annotation is capable of providing all the information necessary for data analysis, and will improve the acquisition and retention of skills, and compliance with field practice standards. Finally, a streamlined annotation set may offer greater potential for eventual integration with future attempts automation of test data analysis algorithms, that may provide more tools for practitioners, researchers, polygraph programs, and thus their referring professionals and consumers of polygraph test results.

We propose the standardization of a simplified categorical annotation set that is easier to learn, remember, achieve and maintain compliance in field practice, and implement into automated data analysis methods. Examiner training and skill development should continue to emphasize the use of in-test annotations, in addition to comments and notes.