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Scott et al.

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(54) **METHOD AND APPARATUS FOR ASSESSING SENSORIMOTOR PERFORMANCE**

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(65) **Prior Publication Data**

(56) **References Cited**

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(Continued)

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(57) **ABSTRACT**

A method and apparatus for quantifying differences in human sensorimotor performance useful for diagnosing,

(56) **References Cited**

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Cluff, T., Scott, S.H. Apparent and actual trajectory control depend ments in rapid motor decisions and actions after stroke. Journal of NeuroEngineering and Rehabilitation.

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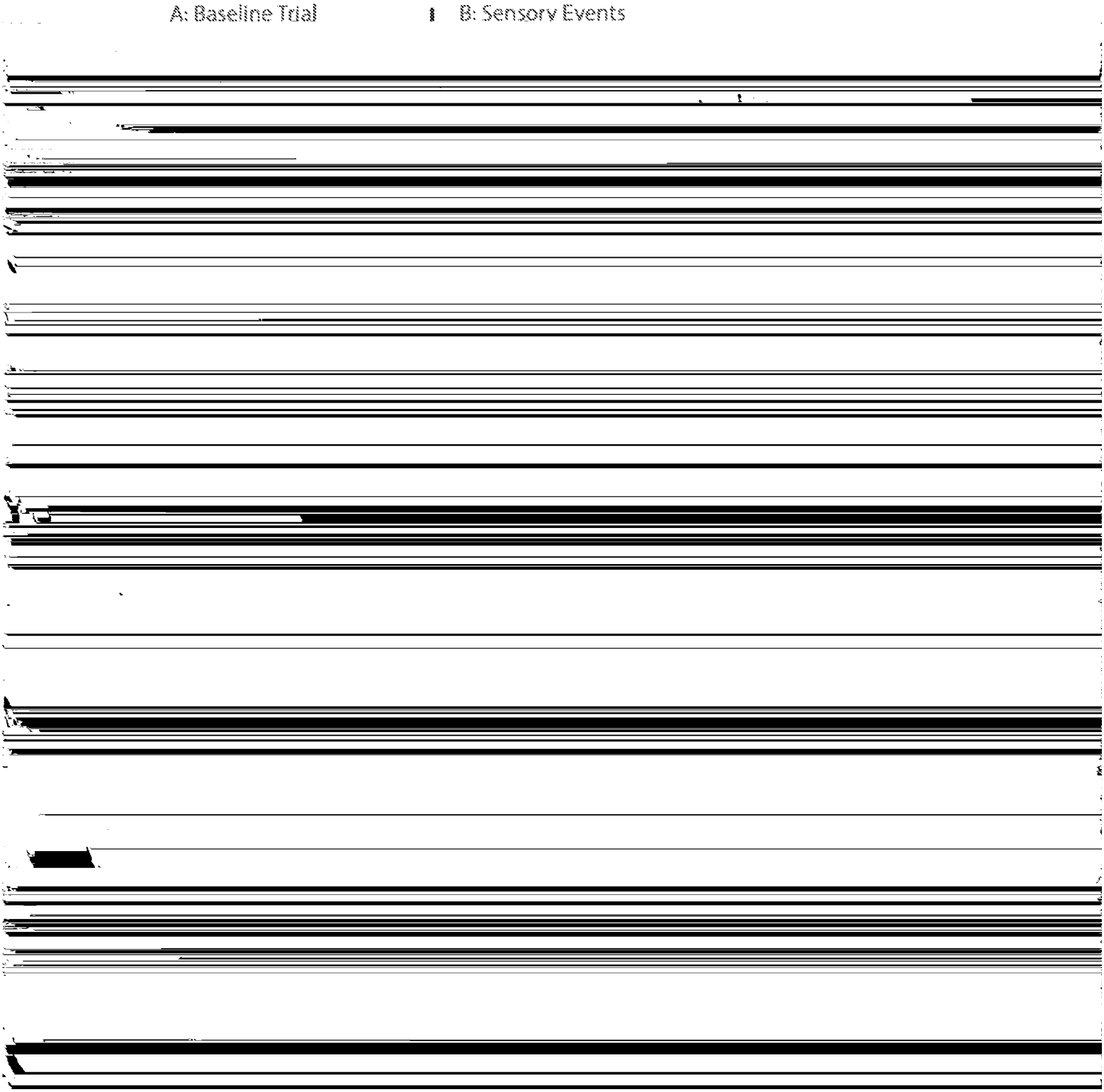
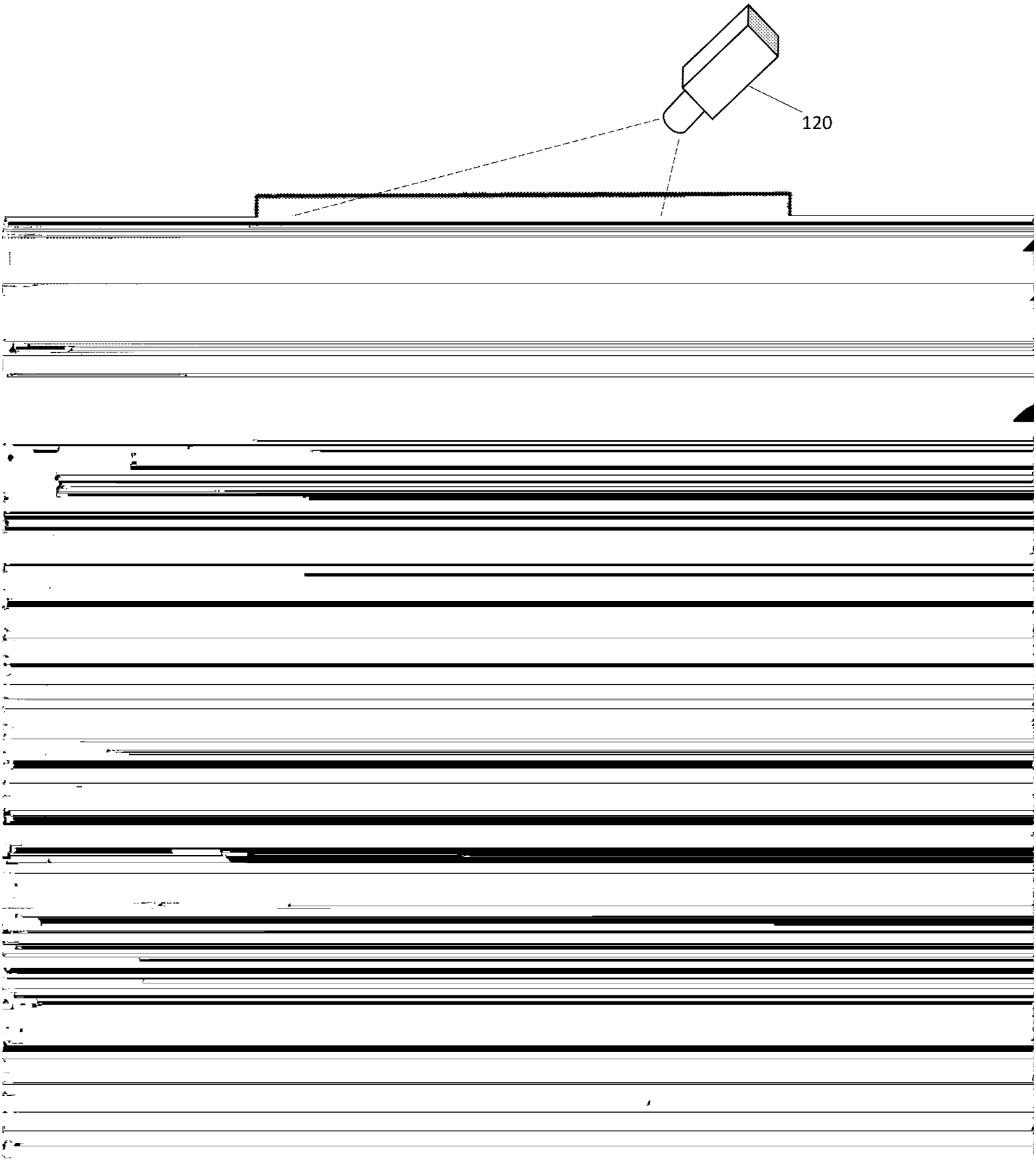
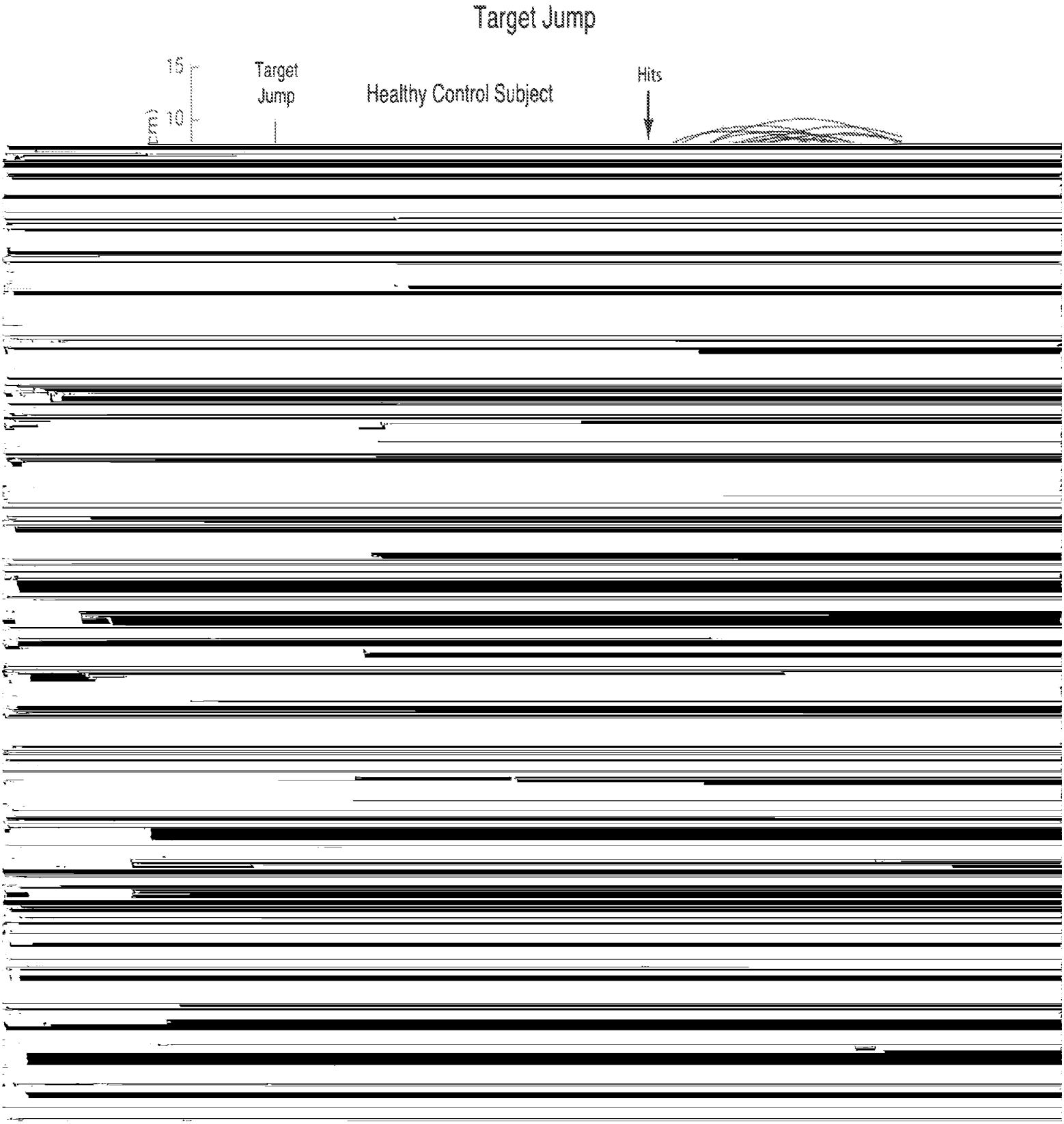
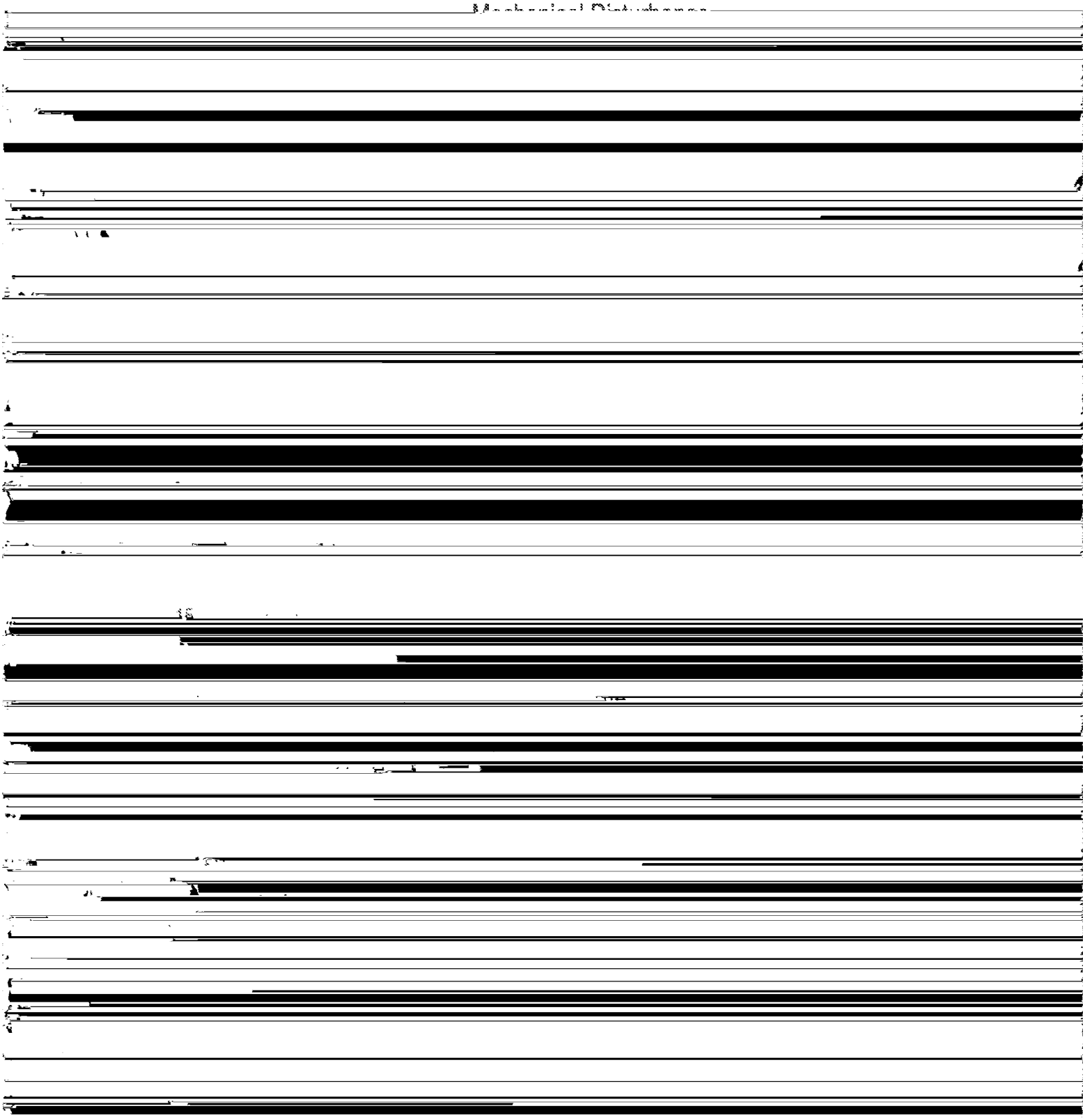
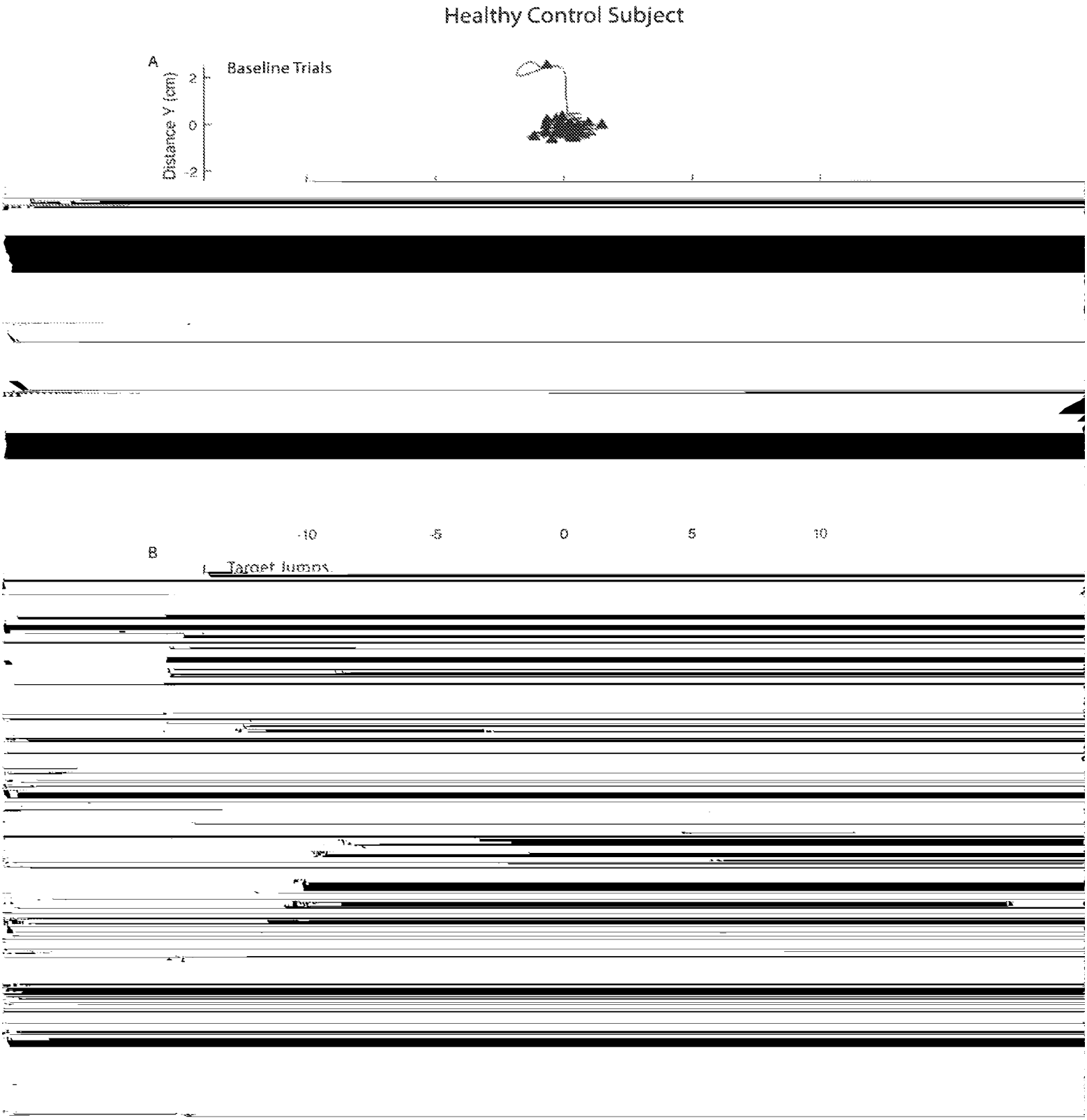
Tyryshkin, K., Coderre, A. M., Glasgow, J. I., Harter, T. M., Bagg,

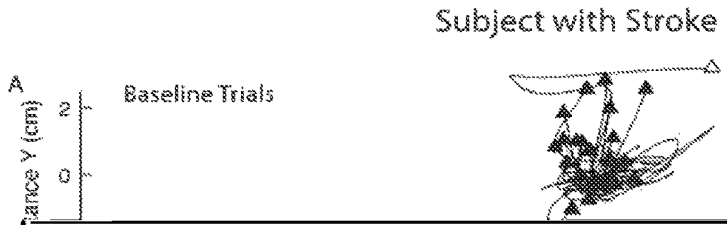

A: Baseline Trial
B: Sensory Events

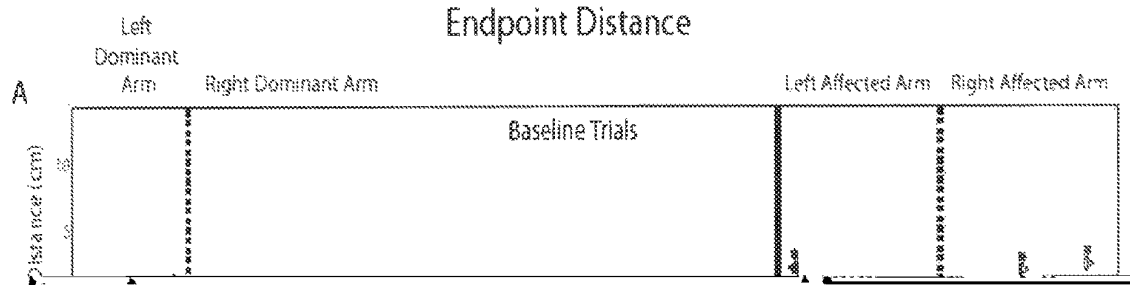

120


Target Jump
15
10
Target Jump
Healthy Control Subject
Hits




Healthy Control Subject
A
Baseline Trials
Distance X (cm)
2
0
-2
-10
-5
0
5
10
B
Target Jumps


Subject with Stroke
A
Baseline Trials
2
0


A
Endpoint Distance
Left Dominant Arm
Right Dominant Arm
Left Affected Arm
Right Affected Arm
Baseline Trials
Distance (cm)

METHOD AND APPARATUS FOR

100 ms leading to changes in limb motion in under 200 ms

[redacted]

PERFORMANCE

an eye takes 200 to 300 ms, it is very difficult for anyone to

[redacted]

RELATED APPLICATION

This application claims the benefit of the filing date of

by visual inspection.

Automated processes have been developed such as computer-based assessments. For example, CANTAB (Cam-

accurate assessment of four different types of sensory feedback processing can quickly increase to 20 minutes for various patient groups.

Another problem is that subjects with poor motor abilities may be much slower and not follow a roughly direct path to the goal (Coderre et al., 2010). These substantial differences in non-perturbed reaching make it difficult to directly compare their motor corrections relative to healthy subjects that

[redacted]

display a stereotypical bell-shaped velocity profile and move relatively straight to the spatial goal (Morasso 1981; Sergio and Scott, 1999). Simple postural tasks have been used to

[redacted]

kinetic data of the limb or the at least one portion of the limb with respect to a presented object.

The method may comprise obtaining data relating to one or more autonomic functions of the subject.

The method may comprise presenting objects to the subject using virtual reality or augmented reality in two or three dimensions.

The method may comprise using a mechanical linkage to

[redacted]

obtain position data and/or motion data and/or kinetic data of the limb or the at least one portion of the limb.

The method may comprise using a motion tracking sys-

[redacted]

BRIEF DESCRIPTION OF THE DRAWINGS

DETAILED DESCRIPTION OF EMBODIMENTS

In order to show more clearly the invention and how it

A key feature of motor function is to quickly respond to

military related to whether an individual can be safely redeployed after an event has occurred during combat.

In the embodiments described herein objects presented to the subject may be real or virtual objects. Virtual objects

ing data on the motion, position, and/or kinetics of a limb

virtual reality goggles or other virtual reality or augmented

[redacted]

and the subject was free to hit the objects with paddles virtually attached to either hand. This prior task cannot address the question of motor corrections as the subject has a second or more to hit each object, well beyond the time

Number of Misses. The number of trials in which the subject was unable to successfully make contact with the ball.

Reaction Time. Reaction time is a measure of movement

brain. The hands are free to move throughout a large

Movement onset is defined as the earlier time point

performance is for the dominant arm, whereas performance

Morasso, P. Spatial control of arm movements. *Experimen-*

feedback processing for motor actions. Trends in Neuro-

the subject's motor response is different than the motor response initially instructed.

the limb or at least one portion of the limb to movement within a workspace;

a display device configured to present a single object to