

Perceived Exertion (RPE), Comfort, and Control Assessment

As you become more familiar with your body's reactions during exercise, you'll learn to recognize when it's time to change how hard you work. For instance, consider a walker aiming for **moderate-intensity exercise**. Their target would be to hit a "somewhat hard" level, corresponding to **12-14 on the Borg Scale**. Should they find their effort registering as "very light" (a 9 on the Borg Scale), this is an indicator to ramp up your pace. Conversely, if the walker experiences his or her effort as "extremely hard" (ranking at 19 on the Borg Scale), it's a sign to reduce the intensity, slowing down to stay within the moderate-intensity zone.

Rating of Perceived Exertion

- 6 - No exertion, sitting and resting
- 7 - Very, very light
- 8 - Very, very light
- 9 - Very light
- 10 - Very light
- 11 - Fairly light
- 12 - Somewhat hard
- 13 - Somewhat hard
- 14 - Somewhat hard
- 15 - Hard
- 16 - Very hard
- 17 - Very hard
- 18 - Very, very hard
- 19 - Extremely hard
- 20 - Maximum exertion (Borg, 1998)

1. Scoop Shovel

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Shovel Use

Participant Information:

Participant ID:

Shovel Types (A, B, C, D, E, F, G, H, I, J, K, L, M, N.....):

Task Description: Scoop up wood pellets and transfer them to a wheelbarrow.

Comfort Evaluation for Scoop Shovel:

1. On a scale from 1 to 5, rate the overall comfort of using the shovel (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

(Rating Shovel 1 2 Shovel 2 3 Shovel 3 4).



- 2. Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Shovel 1 Some bicep
 Shovel 2 very slight lower back
 Shovel 3 lower + mid back

- 3. Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Shovel 1 the ergonomic handle helped a lot so I didn't have to bend over much
 Shovel 2 short handle ^(on the shovel itself) made scooping difficult
 Shovel 3 blunt shovel end made me have to exert more force

- 4. Suggest improvements for the shovel's comfort.

Shovel 1 changing the slotted grip on the ergonomic handle to be more comfortable
 Shovel 2 longer shovel handle
 Shovel 3 add bevel to edge of shovel

Worksheet 2: Control and Perceived Exertion Assessment for Shovel Use

Control Evaluation:

- 5. On a scale from 1 to 5, rate your perceived level of control while using the shovel (**1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all**).

1. (Rating Shovel 1 1 Shovel 2 2 Shovel 3 2).

- 2. Discuss the shovel's ability to maintain control over the load.

Shovel 1 handle provided extra stability
 Shovel 2 no issues, but shovel handle is shorter
 Shovel 3 hard to scoop b/c of harsh edge

- 3. Identify any design aspects of the shovel that hindered control.

Shovel 1 couldn't turn as well w/ the attachment
 Shovel 2 couldn't turn as well w/ attachment
 Shovel 3 couldn't turn as well w/ attachment

- 4. Recommend enhancements for better control.

Shovel 1 no suggestion
 Shovel 2 longer shovel handle



Shovel 3 bevel edge to scoop easier

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the Borg RPE scale (6-20), rate your perceived exertion.

(Rating Rating Shovel 1 10 Shovel 2 13 Shovel 3 13).



2. Pitchfork

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Pitchfork Use

Pitchfork Type (A, B, C, D, E, F, G, H, I, J, K, L, M.....):

Task Description: Removing straw mixed with dung and transferring them to a wheelbarrow.

Comfort Evaluation for Pitchfork:

- 6. On a scale from 1 to 5, rate the overall comfort of using the pitchfork (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

1. (Rating Pitchfork 1 3 Pitchfork 2 2 Pitchfork 3 2).

- 2 Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Pitchfork 1 Shoulder & wrist

Pitchfork 2 forearm

Pitchfork 3 forearm

- 3 Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Pitchfork 1 heaviness of fork increased my effort

Pitchfork 2 slots on grip slightly uncomfortable, grip a little long

Pitchfork 3 grip let me stand up straight to clear

- 4 Suggest improvements for the shovel's comfort.

Pitchfork 1 lighter material

Pitchfork 2 shorter ergonomic grip

Pitchfork 3 shorter ergonomic grip



Worksheet 2: Control and Perceived Exertion Assessment for Pitchfork Use

Control Evaluation:

7. On a scale from 1 to 5, rate your perceived level of control while using the (1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all).

1 (Rating Pitchfork 1 2 Pitchfork 2 2 Pitchfork 3 1).

2 Discuss the shovel's ability to maintain control over the load.

Pitchfork 1 good, thinner spindles let material slip

Pitchfork 2 good, difficult to turn over because of grip

Pitchfork 3 good, difficult to toss soiled material

3 Identify any design aspects of the shovel that hindered control.

Pitchfork 1 heaviness, thin spindles, thick handle

Pitchfork 2 small fork head lead to spilling on sides

Pitchfork 3 long ergonomic grip

4 Recommend enhancements for better control.

Pitchfork 1 lighter material

Pitchfork 2 bigger fork head, maybe shorter ergonomic grip

Pitchfork 3 shorter ergonomic grip, less bulky handle at the end

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the **Borg RPE scale (6-20)**, rate your perceived exertion for pitchforks.

(Rating Pitchfork 1 13 Pitchfork 2 11 Pitchfork 3 11).

General Instructions:

Participants should complete these assessments after using each tool type for the designated tasks. Feedback should be detailed, focusing on ergonomic efficiency, cardiovascular effort, and perceived exertion to guide recommendations for design improvements. This approach ensures that the assessment captures not only



the subjective and physical aspects of using the tools but also the cardiovascular impact, providing a comprehensive understanding of their ergonomic efficiency.

Perceived Exertion (RPE), Comfort, and Control Assessment

As you become more familiar with your body's reactions during exercise, you'll learn to recognize when it's time to change how hard you work. For instance, consider a walker aiming for **moderate-intensity exercise**. Their target would be to hit a **"somewhat hard"** level, corresponding to **12-14 on the Borg Scale**. Should they find their effort registering as **"very light"** (a **9 on the Borg Scale**), this is an indicator to ramp up your pace. Conversely, if the walker experiences his or her effort as **"extremely hard"** (ranking at **19 on the Borg Scale**), it's a sign to reduce the intensity, slowing down to stay within the moderate-intensity zone.

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1 W red
 2 X pink
 3 U white

1. Scoop Shovel

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Participant Information:

Participant ID:

Shovel Types (A, B, C, D, E, F, G, H, I, J, K, L, M, N.....):

Task Description: Scoop up wood pellets and transfer them to a wheelbarrow.

Comfort Evaluation for Scoop Shovel:

1. On a scale from 1 to 5, rate the overall comfort of using the shovel (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

(Rating Shovel 1 3 Shovel 2 4 Shovel 3 3).

2. Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Shovel 1 wrist in the turning motion dumping the soil bedding, slight lower back

Shovel 2 lower back

Shovel 3 lower back

3. Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Shovel 1 slight curve in handle helped

Shovel 2 short handle increased back discomfort from the way I was scooping

Shovel 3 lack of bevel on the bucket made me have to put in more effort

4. Suggest improvements for the shovel's comfort.

Shovel 1 no handle at the end of the shovel

Shovel 2 make the handle longer to make it easier to scoop

Shovel 3 add bevel to bucket, maybe make slots bigger for less shaking

Worksheet 2: Control and Perceived Exertion Assessment for Shovel Use

Control Evaluation:

5. On a scale from 1 to 5, rate your perceived level of control while using the shovel (1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all).

1. (Rating Shovel 1 1 Shovel 2 1 Shovel 3 2).

2. Discuss the shovel's ability to maintain control over the load.

Shovel 1 deep bucket helped to get bigger scoops

Shovel 2 good, no issue

Shovel 3 ~~good, no issue~~ difficult to scoop what I was wanting

3. Identify any design aspects of the shovel that hindered control.

Shovel 1 no issues

Shovel 2 shallow bucket

Shovel 3 lack of bevel on bucket/blunt end

4. Recommend enhancements for better control.

Shovel 1 no issues

Shovel 2 different bucket shape



Shovel 3 Devel edge of shovel

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the Borg RPE scale (6-20), rate your perceived exertion.

(Rating Rating Shovel 1 11 Shovel 2 13 Shovel 3 12).

2. Pitchfork

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Pitchfork Use

Pitchfork Type (A, B, C, D, E, F, G, H, I, J, K, L, M.....):

Task Description: Removing straw mixed with dung and transferring them to a wheelbarrow.

Comfort Evaluation for Pitchfork:

6. On a scale from 1 to 5, rate the overall comfort of using the pitchfork (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

1. (Rating Pitchfork 1 3 Pitchfork 2 2 Pitchfork 3 2).

2 Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Pitchfork 1 arms + shoulders

Pitchfork 2 forearms, slight midback

Pitchfork 3 shoulders, slight back

3 Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Pitchfork 1 grip on end made more comfortable, straightness made more uncomf.

Pitchfork 2 I liked the handle at the end, but the grip in the middle was too low

Pitchfork 3 grip in middle is comfortable, at the end it is bulky

4 Suggest improvements for the shovel's comfort.

Pitchfork 1 add a bend in handle or on fork

Pitchfork 2 make grip of fork higher up

Pitchfork 3 less bulky grip at the end



Worksheet 2: Control and Perceived Exertion Assessment for Pitchfork Use

Control Evaluation:

7. On a scale from 1 to 5, rate your perceived level of control while using the (1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all).

1 (Rating Pitchfork 1 3 Pitchfork 2 2 Pitchfork 3 1).

2 Discuss the shovel's ability to maintain control over the load.

Pitchfork 1 thin spindles far apart made it difficult to keep soil material on fork

Pitchfork 2 ok, but fork area was so small I lost a lot of soil material

Pitchfork 3 lots of control, I liked the deep area of the head for sifting

3 Identify any design aspects of the shovel that hindered control.

Pitchfork 1 straightness of fork, heaviness

Pitchfork 2 fork area small, grip on fork too low

Pitchfork 3 bulky grip on top

4 Recommend enhancements for better control.

Pitchfork 1 make spindles closer together, add bend in fork part

Pitchfork 2 larger fork area, higher grip

Pitchfork 3 less bulky grip on top

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the Borg RPE scale (6-20), rate your perceived exertion for pitchforks.

(Rating Pitchfork 1 12 Pitchfork 2 11 Pitchfork 3 11).

General Instructions:

Participants should complete these assessments after using each tool type for the designated tasks. Feedback should be detailed, focusing on ergonomic efficiency, cardiovascular effort, and perceived exertion to guide recommendations for design improvements. This approach ensures that the assessment captures not only