

# Borg CR10 skala

Historisk bakgrunn, og originalversjon av skalaen  
(på engelsk)

Forfatter Gunnar Borg

Godkjent norsk oversettelse av skalaen

Glittreklinikken AS

Februar 2002

# The Borg CR10 Scale

## A method for measuring intensity of experience, e.g., perceived exertion and pain

by

*Gunnar Borg, Professor Emeritus of Perception and Psychophysics  
Stockholm University, Sweden*

It is important to be able to determine the strength of our feelings and experiences in many different situations. Our sensory perceptions - what we experience through our vision, hearing, somatosensory perception, smell and taste - provide us with a good picture of the reality in which we live. Thanks to our senses, we can orient ourselves in our surroundings, find our way and adapt ourselves in the best possible fashion. But our senses don't only give us a picture of the world outside. They also help us to understand ourselves - our inner world in sickness and in health. Well-functioning senses are important. They allow us to identify objects, food that has gone bad, polluted air and noise levels that are too high. It is also essential that we listen to our body signals - to exertion and tiredness, to hunger and satiation, aches and pains, stress, discomfort and other emotions. The senses are good "instruments" that can alert us to problems in the environment and in our bodies, for example, to symptoms of illness.

Most of the impressions we take in aren't especially strong, but instead rather weak. The tone of a normal conversation, the music at the department store, the saltiness of food, the smells from the garden, the lighting in the family room and the annoyance of the office ventilation are all only moderately intense. But sometimes we experience extremely strong stimuli: we're blinded by the sun; we burn our mouths on the soup; feel extreme anxiety; or are inflicted with pain.

There are many circumstances in which we need to measure the intensity of a perception or feeling. Simply saying that it's noisy, that you're out of breath or in pain or that you feel anxious isn't enough. It's important to know how strong the experience is. Within clinical diagnostics, we need to determine symptoms of illness for appropriate treatment. In investigations of the ergonomics of a working environment, we try to measure the degree of strain and difficulty of physical as well as psychological nature. In the areas of sports and exercise, we strive to identify degree of exertion in order to attain the best training intensity.

The importance of trying to determine intensity of experience has been recognized from time immemorial. But scientific studies in the area are relatively modern. Fechner worked on these problems during the 1800s, and proposed that the perceptual intensity grows with the logarithm of the physical intensity. He based this idea mainly on theoretical assumptions, and no satisfactory scaling method was developed. The common approach at the time - and often still today - was to use a simple category scale with, for example, numbers from one to five or seven that were tied to verbal expressions, placed "symmetrically". Such scales do not have satisfactory metrical features. They offer, however, possibilities for rough estimations of direct levels of intensity.

In the 1940s, and 50s S.S. Stevens from Harvard University developed methods for "ratio scaling". The purpose was to measure perceptual intensity on a ratio scale analogous to those used in the natural sciences, that is, a scale with an arbitrary unit, equal step sizes and an absolute zero. Thanks to Stevens and collaborators - and Gösta Ekman and his collaborators in Sweden ("The Stockholm School") - stimulus (S) - response (R) - functions could now be empirically determined. These functions showed the growth in perceptual intensity as a function of stimulus intensity ( $R=f[S]$ ). These growth curves could be described mathematically using power functions of the sort  $R=cS^n$ . The methods presuppose that people can use numbers in a mathematically appropriate way. They were shown to work fairly well for determinations of relative S-R functions, but not for natural level determinations or for direct comparisons between individuals.

The CR10 scale presented here is a very special scale. It was constructed by Borg so as to take advantage of the good properties of Stevens' ratio (R) scaling and, simultaneously, those of category (C) scaling, thus using verbal expressions and numbers in a congruent way for determinations of direct levels on a ratio scale. With correct administration, the scale is both reliable and valid.

**The Borg CR10 Scale** is a general scale for measuring intensities of most kinds of perceptions, experiences and feelings. The scale was founded on ideas and experiments presented by Borg 1962, and then developed by Gunnar Borg during the 1970s, and presented during The International Congress of Psychology in Leipzig in 1980. Afterwards, its primary use has been in clinical diagnosis of aches and pain; in determination of perceived exertion including breathlessness and fatigue in connection with work tests, training and rehabilitation. The main fields of application are found in sports, medicine, ergonomics and human factors. CR-scaling is based on several principles, such as "ratio scaling", Borg's range model and quantitative semantics for positioning of verbal expressions - not to mention results from scientific experiments. A supplementary power function was proposed by Borg:  $R = a + c(S - b)^n$ , where  $a$  and  $b$  refer to the starting point of the curve, which depends upon intensities at rest without external stimulation (or the absolute threshold). This function is general and adapted to psychophysiological descriptions. "Category-Ratio" scaling had never been tried before, and the CR10 scale has thus opened new opportunities for meaningful and direct scaling of perceptions, i.e., for "verbally level anchored ratio scaling". The scale is constructed to obtain congruence in meaning between numbers and anchors. By entering 0.5 ("Extremely weak"), a simple number range to 10 ("Extremely strong") could be secured to cover a suitable (but minimal) subjective, dynamic range from one to twenty. Sometimes a more fine graded scale is needed and the CR100 scale was therefore constructed (also called the centiMax (cM) scale), which mainly is a development of the CR10 scale (also called the deciMax (dM) scale). See Borg and Borg (1998). To encourage people to follow the instruction, and not only to use whole numbers but also half values and decimals, the latest copy of the scale (Borg, 1998) includes a few numbers with one decimal.

**Testing perceived exertion during work.** When making determinations of perceived exertion, it is common to use Borg's RPE scale, but the CR10 is used as well. The CR10 scale gives a non-linear, somewhat positively accelerating growth function. Both scales have their pros and cons. The RPE scale's linear growth function (linear with regard to aerobic demands) may, during certain conditions, be considered an advantage. CR10 gives, however, a perceptually more correct growth function and, therefore, can be preferable when testing patients with severe symptoms, such as chest pain or dyspnea. Looked at from the point of view of risk, "dangerous exertion" doesn't grow linearly with increased load, but probably according to a positively accelerating function. There is a nonlinear relation between the RPE scale and the CR10 scale. (For a transformation, see Borg [1998]). For healthy subjects it is often the case that only "overall perceived exertion" is rated. When registering ratings of perceived exertion there is seldomly a need to use a higher number than 12. For patients it's advisable to ask for "chest pain", "breathlessness", and "aches and fatigue" in the working muscles (e.g. legs), and if any additional symptoms.

**Pain testing.** The CR10 scale is now used in clinical diagnosis of patients with cardio-pulmonary diseases. But it is also used to evaluate muscle and joint problems and various kinds of pains. An advantage over VAS is its good metric features and the fact that it can be used for two-way communication, that is from the patient to the medical staff and from the staff to the patient, e.g., when making recommendations and therapy plans. After the patient has been given the instructions, he/she should be asked about previous pain experiences and how they would be rated on the scale. One way to improve comparisons - especially in the case of intersubjectivity - is to use a "universal reference", for example, a previous experience of maximal exertion. If the level of that feeling of exertion is "10", how intense have the pain experiences been? The patient may be asked: If you use "10" as the most intense exertion you have ever experienced, how intense would you say that your worst pain experiences have been? If they've been weaker, use a number less than "10". If they've been greater say "11" or "12". If they've been much greater say "15" or even more. In this way a special anchor for the pain intensity can be obtained. (Higher than 15 is seldom meaningful). The worst experienced pain should then be used as a reference and set at "10".

**Testing other perceptions and feelings.** The CR10 scale can be used to measure most types of experiences, not just exertion and pain, but also brightness, loudness and noise, taste and smell, feeling sick, satiation (e.g., with anorexia patients), etc. It can be used to rate the perceived difficulty of mental tasks, the ease of understanding instructions or using certain equipment. It has also been used in other contexts, for example, when measuring the strength of feelings and moods. Every time the scale is used for a particular type of experience, supplementary instructions must be given without changing the original verbal expressions (such as "Weak" and "Strong") and their positioning on the scale. The congruence between numbers and words must always be kept as it is on the scale. The number ten (10) is the fundamental anchor and must be well defined and explained. When giving a special instruction for a certain attribute, the words "Weak" and "Strong" may be supplemented, e.g., when testing loudness by exchanging "Light" with "Soft" (or "Quiet") and "Heavy" with "Loud".

**Test administration.** When administering the CR10 scale, the general principles and practices associated with other types of tests should be used. After the "Main Instructions", specific training material can be used, for example, Borg's test of rating behavior. It is possible to use example questions about the perceptual intensity of certain things, such as the blackness of velvet (approx. "9"); the sourness of a lemon (approx. "6"), the sweetness of a ripe banana (approx. "4"); or the loudness of normal conversation (approx. "2.5"). The test leader must be certain that the individual understands the instructions and use of the scale and should check this by using, among other things, the above questions (Avoid those that may interfere with the test items). The instruction to perceived exertion should always be used for information and training, even if the modality to be tested is quite different, such as taste, mental difficulty or anxiety. In diagnostic tests it is often advisable to ask the person about several symptoms, not only those that are in focus, but also some more "neutral" ones, that should not be affected by a possible disease. A profile of symptoms (Borg, 1998) may then be obtained to facilitate differential diagnostics, e.g., in patients with dyspnea or angina pain.

The special properties of the CR10 scale are a great advantage when working on obtained responses and interpreting results. It combines "The richness of language with the exactness of numbers". The construction makes it possible to use parametric statistics (descriptive and inferential, e.g., ANOVA) including determinations of mathematical S - R - functions. The CR10 scale is thus a new type of ratio scaling method, since it is a "Verbally Level Anchored Ratio Scale".

### Literature

Borg, G. (1998). Borg's Perceived Exertion and Pain Scales. Champaign, IL:HK. Can be ordered from: Human Kinetics. In the USA: P.O. Box 5076, Champaign, IL 61825-5076, and in Europe: P.O. Box IW14, Leeds, LS16 6TR, UK.

This folder, with separate copies of the scale and instructions, can be obtained directly from Gunnar Borg, Borg Perception, Rådisvägen 124, S-165 73 Hässelby, Sweden. © Gunnar Borg, 1998.

**Gunnar Borg**, PhD, is professor emeritus of Perception and Psychophysics at Stockholm University. He introduced the field of perceived exertion in the 1960s, and has won international renown for developing scaling methods for measuring intensity of experience. The "Category - Ratio" scaling method is a very special "instrument" since it combines the richness of words with the exactness of numbers. It is, thus, the first scale constructed as a "level anchored ratio scale". The fields of application are wide ranging, including determinations of subjective somatic symptoms, such as aches and pain, perceived exertion and breathlessness (dyspnea), and most kinds of ordinary perceptions and emotions. Borg's educational background includes psychology, philosophy, education, and physiology. He was Associate Professor at the Medical School in Umeå, Sweden, from 1962 to 1968. From 1968 to 1980, he was director of the Institute of Applied Psychology, and in 1987, he filled a newly created chair in Perception and Psychophysics at the Department of Psychology, Stockholm University. He has been, on several occasions, visiting professor in the US. Gunnar Borg is the author of more than 250 scientific publications. He has organized and served as chair of numerous international symposia and has lectured worldwide. Borg has collaborated extensively with colleagues in the US and Canada, Europe, Japan, and Brazil.

In 1992, the ACSM nominated him for the Australia Prize for research in the field of perception for the benefit of mankind. He received the 1998 Award from IAAP, "for exceptional contributions to the advancement of the science of psychology internationally". This award is only given once every fourth year during the international congress of IAAP to a psychologist in all fields of psychology, including "sport psychology". In 1998, he was also honored with the Award for scientific contributions and applications in ergonomics by the Nordic Ergonomic Society. Recently (2000), at the society's first annual meeting, Borg was honored by the Swedish Society of Sports Medicine (the meeting was organized and chaired by prof. Per Renström, Karolinska Institutet, Stockholm) as a "living legend" in sport medicine from last century together with the professors Eijnar Ericsson (orthopedic medicine) and Per-Olov Åstrand (exercise physiology). During the 27th International Congress of Psychology, July 2000, Borg was honored with a special symposium: "The Gunnar Borg Symposium on Psychophysical Scaling" (dealing mainly with Borg's theories, methods and experiments on perceived exertion). The same year, 2000, Borg was invited by the Swedish Society for Lung Medicine, to deliver a key-note address on "How to measure (subjective) somatic symptoms", and elected "Honorary Member" of the society. Borg is a member of the Royal Swedish Academy of Engineering Sciences and several international associations.

0	Nothing at all	"No I"
0,3		
0,5	Extremely weak	Just noticeable
0,7		
1	Very weak	
1,5		
2	Weak	Light
2,5		
3	Moderate	
4		
5	Strong	Heavy
6		
7	Very strong	
8		
9		
10	Extremely strong	"Strongest I"
11		

● Absolute maximum

Highest possible

Borg CR10 scale  
© Gunnar Borg, 1982, 1998

**Main Instructions:** You will use this rating scale to report how strong your perception or feeling is. This experience can be exertion, pain, difficulty or something else. The letter "I" stands for intensity, and "No I" means that you don't feel any pain (or whatever feeling we ask about). Ten (10) or "Extremely strong - Strongest I" is a very important intensity level (I). It serves as a reference point or "anchor" on the scale. This is the most intense perception or feeling (e.g., of exertion) you have ever had. This is why we call it "Strongest I". It is, however, possible to experience or imagine something even more intense. That's why we've placed "Absolute maximum" outside and further down on the scale without any corresponding number, just a dot ".". If your experience is stronger than "10", you can use a larger number.

First look at the verbal expressions. Start with them and then the numbers. If your experience or feeling is "Very weak", you should say "1", if it is "Moderate", say "3". Note that "Moderate" is weaker than "Medium", "Mean" or "Middle". If the experience is "Strong" or "Heavy" (or the task "Difficult"), say "5". If it is "Very strong" ("Very intense"), choose a number from 6 to 8, depending upon how intense it is. Feel free to use half-numbers like "1.5" or "3.5", or decimals like "0.7", "0.8", or "2.3". It's very important that you report what you actually experience or feel, not what you think you should report. Be as honest as possible and try to avoid under- or overestimating the strength of your experience. Look at the verbal descriptors and then choose a number.

**Rating perceived exertion:** We would like you to give a number that corresponds to your feeling of exertion, that is, how hard and strenuous you perceive the work to be. This depends mostly on your muscle exertion and tiredness, and on your feeling of breathlessness or breathing difficulties. The feeling of exertion can also be affected by pain in the chest or joints. It's important that you only think about what you feel - your feelings - and not about what the actual load is.

- 1 Corresponds to a "very light" exercise. For a normal, healthy person it is like walking slowly at his or her own pace for some minutes.
- 3 Somewhat but not especially hard. It feels good and it's not difficult to go on.
- 5 Is hard and tiring, but continuing isn't terribly difficult.
- 7 "Very strong" is quite strenuous. A healthy person can still go on, but he or she really has to push him- or herself. It feels very heavy and the person is very tired.
- 10 "Extremely strong - Strongest I" is extremely strenuous work. For most people this is the most strenuous exertion they have ever experienced.
  - Is "Absolute maximum", for example "12" or even more.

**Rating pain:** You will be asked to evaluate your pain and estimate how great it is. In order to understand how to do this, you should be acquainted with the above instruction for exertion.

What is your worst, most intense experience of pain? Think about this and then explain how it felt. Call your worst, most intense experience of pain ten ("10").

- 10 "Extremely intense - Strongest I" is your main reference point or "anchor". Use "10" for the worst pain experience you have ever had; the one you just described.
  - Is "Absolute maximum". There can be pain that is worse than what you have experienced (worse than your "Strongest I"). If you now are experiencing a pain that is somewhat more intense than that, you should say "11" or "12". If it is much more intense, for example 1.5 times as strong as "Strongest I", you should say "15".

First look at the verbal expressions and then choose a number. Try to estimate only the pain itself, not what it means to you, how much discomfort you have or how much you are suffering. Such feelings are important, of course, but you may try to rate separately how strong they are.

**Emergency situations:** It may not be possible to give a patient full instructions, but only feasible to show the scale, point to the numbers and the anchors, and give reduced (best possible) instructions (and then make a note of that).



---

SENTER FOR LUNGEMEDISINSK BEHANDLING OG REHABILITERING

Bestilling:  
Glittreklinikken AS  
Respirasjonsfysiologisk lab.  
1488 Hakadal  
Telefon: 6705 8000  
Email: [glittre@glittreklinikken.no](mailto:glittre@glittreklinikken.no)

## BORG CR10 SKALA.

**Instruksjon:** Du skal nå bruke denne skalaen for å fortelle hvor sterk din opplevelse eller følelse er. Det kan gjelde din opplevelse av anstrengelse, smerte, vanskelighet eller noe annet. Ti (10), ”Ekstremt sterk”, ”Maksimal”, er et meget viktig intensitetsnivå. Det fungerer som et referansepunkt på skalaen. Det er den sterkeste opplevelsen eller følelsen (av for eksempel anstrengelse) du noensinne tidligere har hatt. Det er dog mulig å oppleve eller forestille seg noe som er enda sterkere. Derfor finnes ”Absolutt maksimum” utenfor eller noe lenger ned på skalaen uten noen bestemt siffer og markert med et punktum ”•”. Hvis din opplevelse eller følelse er sterkere enn ”10”, kan du bruke et høyere tall.

Se først på de muntlige uttrykkene og velg så et tall. Dersom din opplevelse eller følelse er ”Svært svak”, velger du ”1”, dersom den er ”Moderat”, velger du ”3”. Tenk på at ”Moderat” er ”3” og altså svakere enn ”Middels” eller ”Midten”. Dersom opplevelsen din er ”Sterk” eller ”Kraftig” (det føles ”Tungt” eller oppgaven er ”Vanskelig”) sier du ”5”. Legg merke til at ”Sterk” er omtrent 50 prosent, dvs. halvparten, av ”Maksimal”. Er den ”Svært sterk” velger du tall fra 6 til 8, avhengig av hvor sterk den er. Du kan godt bruke halve tall, for eksempel ”1,5” eller ”3,5”, eller desimaltall som ”0,3”, ”0,8”, eller ”2,3”: Det er veldig viktig at du gir uttrykk for det som du opplever eller føler, og ikke hva du tror du bør si. Vær så ærlig og spontan som mulig og ikke forsøk verken å overvurdere eller undervurdere. Begynn med et muntlig uttrykk og velg så et tall.

Ved gradering av *anstrengelse* vil vi at du skal angi et tall for din opplevelse av anstrengelse, dvs. hvor tungt og slitsomt du føler arbeidet er og hvor sliten du føler deg. Opplevelsen av anstrengelse avhenger hovedsakelig av trettheten i musklene dine, om du føler deg andpusten og eventuell smerte. Det er viktig at du nå bare tar hensyn til hva du føler og ikke på hva belastningen er egentlig er.

- 0 ”Ingen anstrengelse i det hele tatt” betyr at du ikke rører på deg, bare ligger og hviler
- 1 Meget lett. Som for en frisk person å gå en kort tur i sitt eget tempo.
- 3 Moderat er noe, men ikke spesielt anstrengende. Det føles greit, og det er ikke noe problem å fortsette.
- 5 Arbeidet er anstrengende og slitsomt, men du har ikke store vanskeligheter med å fortsette. Anstrengelsen er omtrent halvparten så sterk som ”Maksimal”
- 7 Meget anstrengende, en veldig sterk påkjenning. Du kan fortsette, men må presse deg selv hardt og du er meget sliten.
- 10 Et ekstremt høyt nivå. Dette er det hardeste de fleste mennesker noen gang har opplevd tidligere.
  - Er ”Absolutt maksimum, for eksempel ”12” eller ende høyere.

**Gradering av smerte:** Du skal nå gradere hva du har for smerte og hvor sterk den er. Det som står skrevet over angående anstrengelse er bra å kjenne til for å forstå hvordan skalaen fungerer.

Hva er den verste, sterkeste opplevelse av smerte du noen gang har hatt? Tenk etter og fortell hvordan det føltes. Kall din sterkeste, mest intense smerteopplevelse for ti (”10”).

- 10 ”Ekstremt sterk - Maksimal” er det viktigste referansepunktet. Bruk ”10” for den sterkeste smerteopplevelse du noensinne har hatt; den du akkurat har beskrevet.
  - Er ”Absolutt maksimum”. Det kan finnes smerte som er enda verre enn den du selv noensinne tidligere har opplevd. Dersom den følelsen er noe sterkere velger du ”11” eller ”12”.

Begynn med et muntlig uttrykk og velg så et tall. Forsøk kun å bedømme bare selve smerten og ikke hva den betyr for deg, hvilke ubehag du har eller hvor sterkt du lider. Slike følelser er selvfølgelig også viktige, men det må du prøve å angi separat.

Noen spørsmål?

0	Ingenting	
0,3		
0,5	Ekstremt svak	Knapt merkbar
0,7		
1	Svært svak	
1,5		
2	Svak	Lett
2,5		
3	Moderat	
4		
5	Sterk	Tung
6		
7	Svært sterk	
8		
9		
10	Ekstremt sterk	"Maksimal"
11		
↳		
•	Absolutt maksimum	Høyest mulig