

Strategic Growth Adjustment

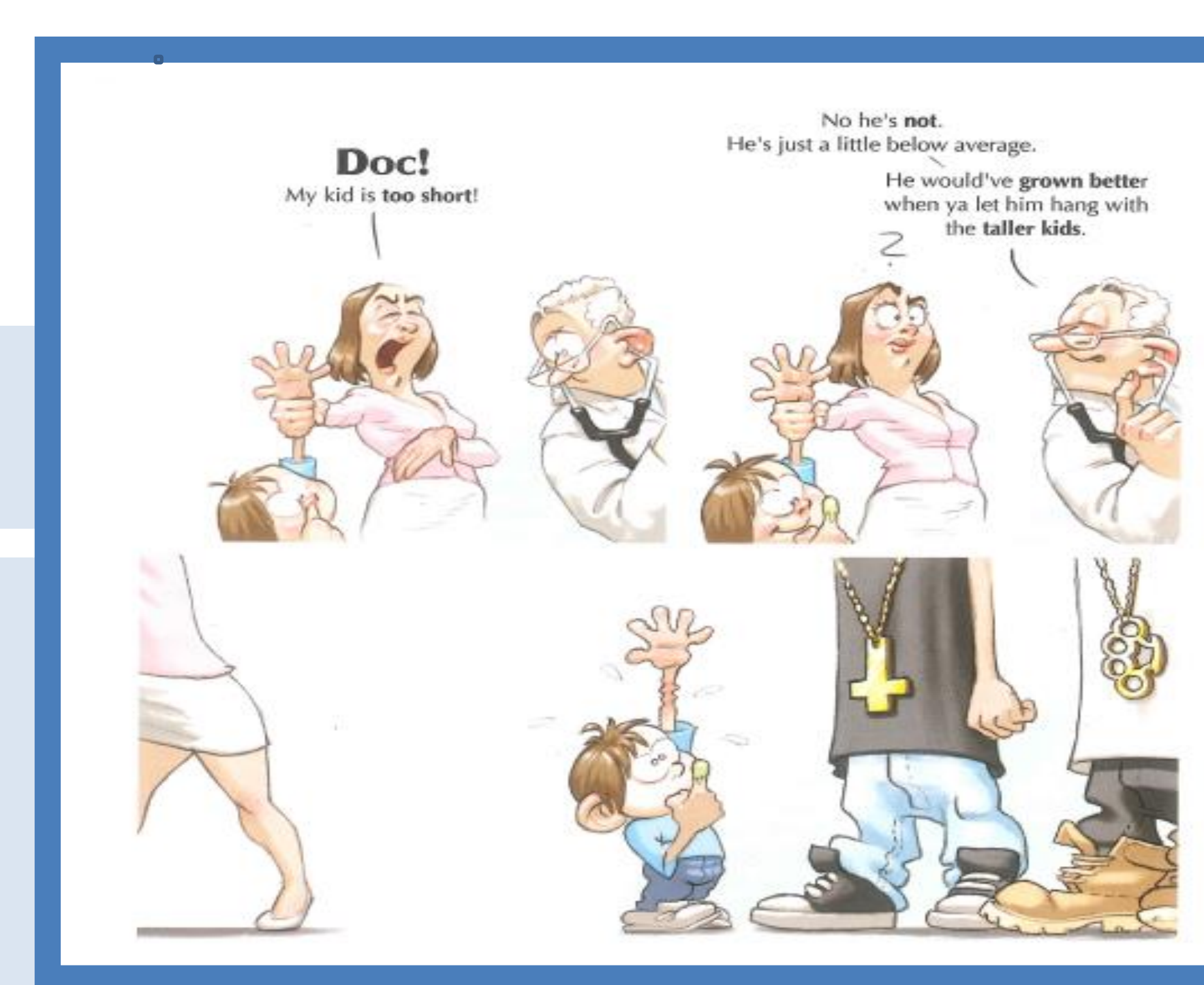
We hypothesize

- 1) democratization and periods of political turmoil facilitate **upward social mobility**, and are accompanied by upward trends in height in the lower social strata
- 2) upward trends in the lower social strata are perceived as **social challenges** yielding parallel, though attenuated trends in the dominant strata.

Methods: We review body height and height distributions of historic and modern data.

Results: Taller stature is associated with higher socioeconomic status. Democratization and periods of political turmoil facilitate upward mobility of the lower social strata, and are accompanied by a general upward height spiral that captures the whole population. Height differences between social strata decrease in the more recent populations.

Strategic growth adjustments allow unifying height within the group (constant height SD) and optimizing stature within the group as a lifelong social signal. Nutrition, health, the general living conditions and care giving, are essential prerequisites for growth, but not to maximize stature.



Determinants of adult body height

The classic interpretation ↔ The new interpretation

MEANS depend on **average living conditions**

VARIANCES depend on **individual conditions**

TARGET **individual height maximum**

Genetics
Nutrition
Health, hygiene (WASH)

Wealth, socioeconomic circumstances

Social strata, career, choice of partner

adaptive within a wide genetic frame*

community effects within the group

relative optimum in the group

Genetics
Nutrition
Health, hygiene (WASH)
→ are "only" biological prerequisites

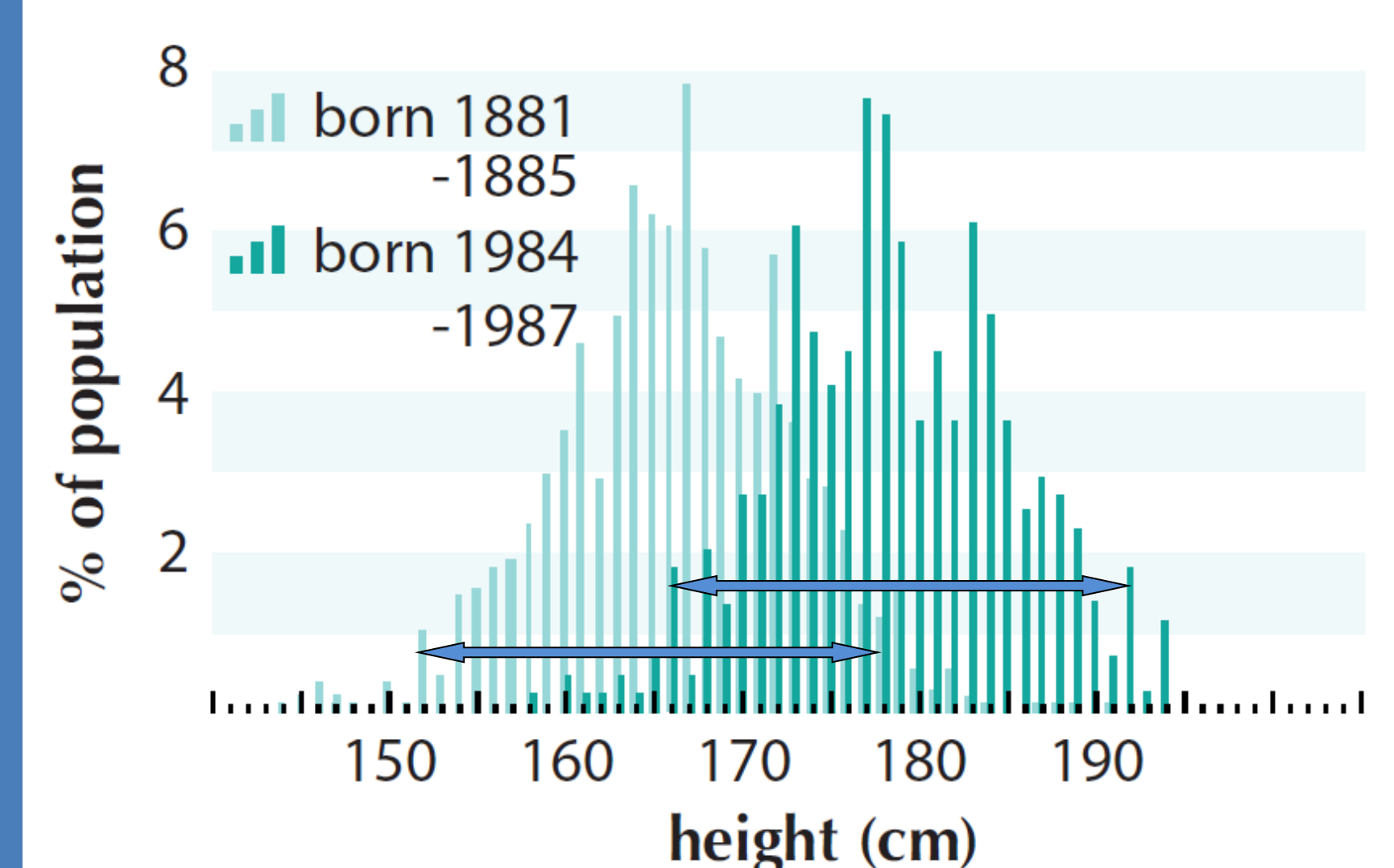
Peer group

→ **mathematical evidence**

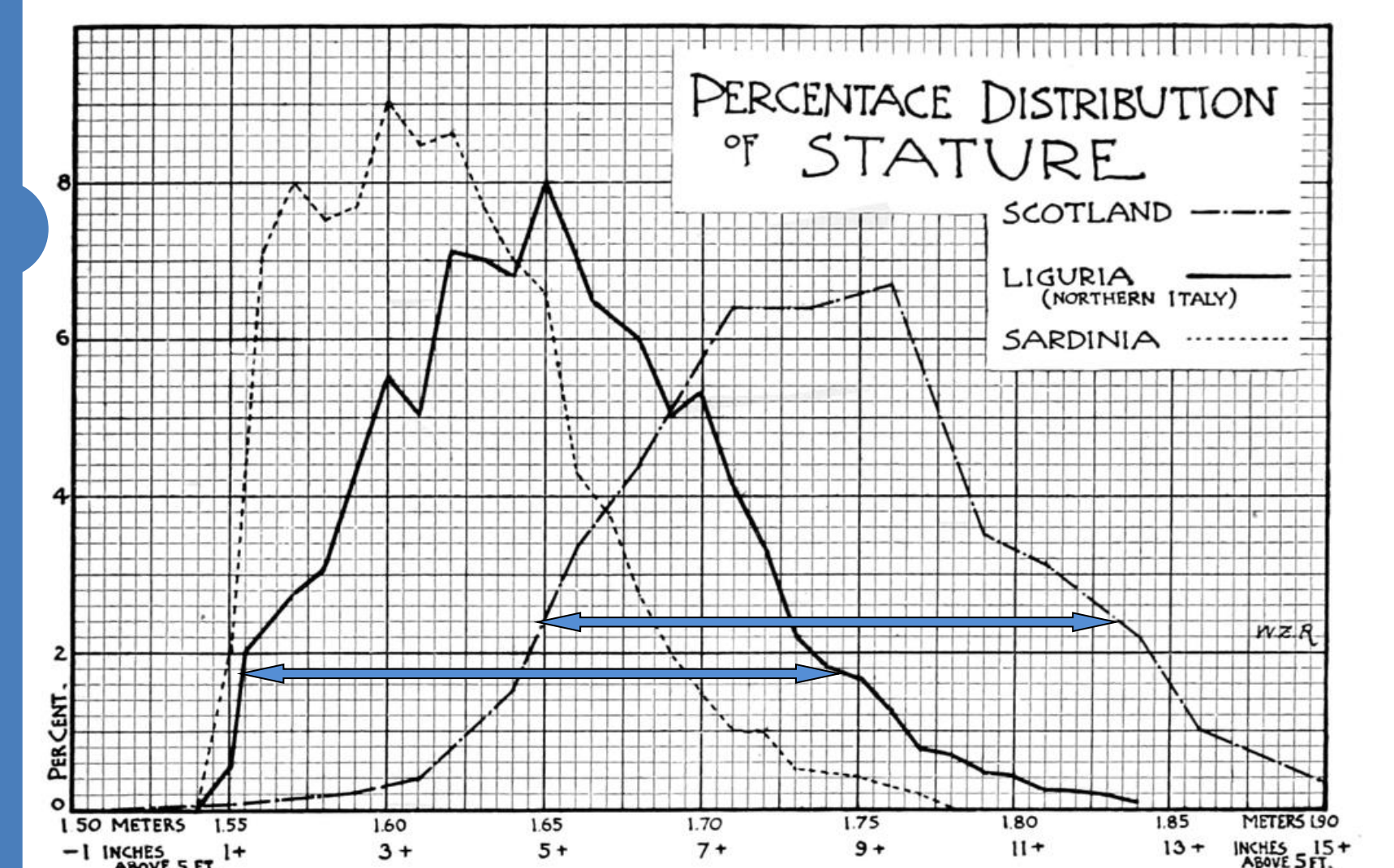
Status: dominance/subordination
→ **zoological evidence**

* Throughout history genetically identical people differed in average height by more than 20 cm

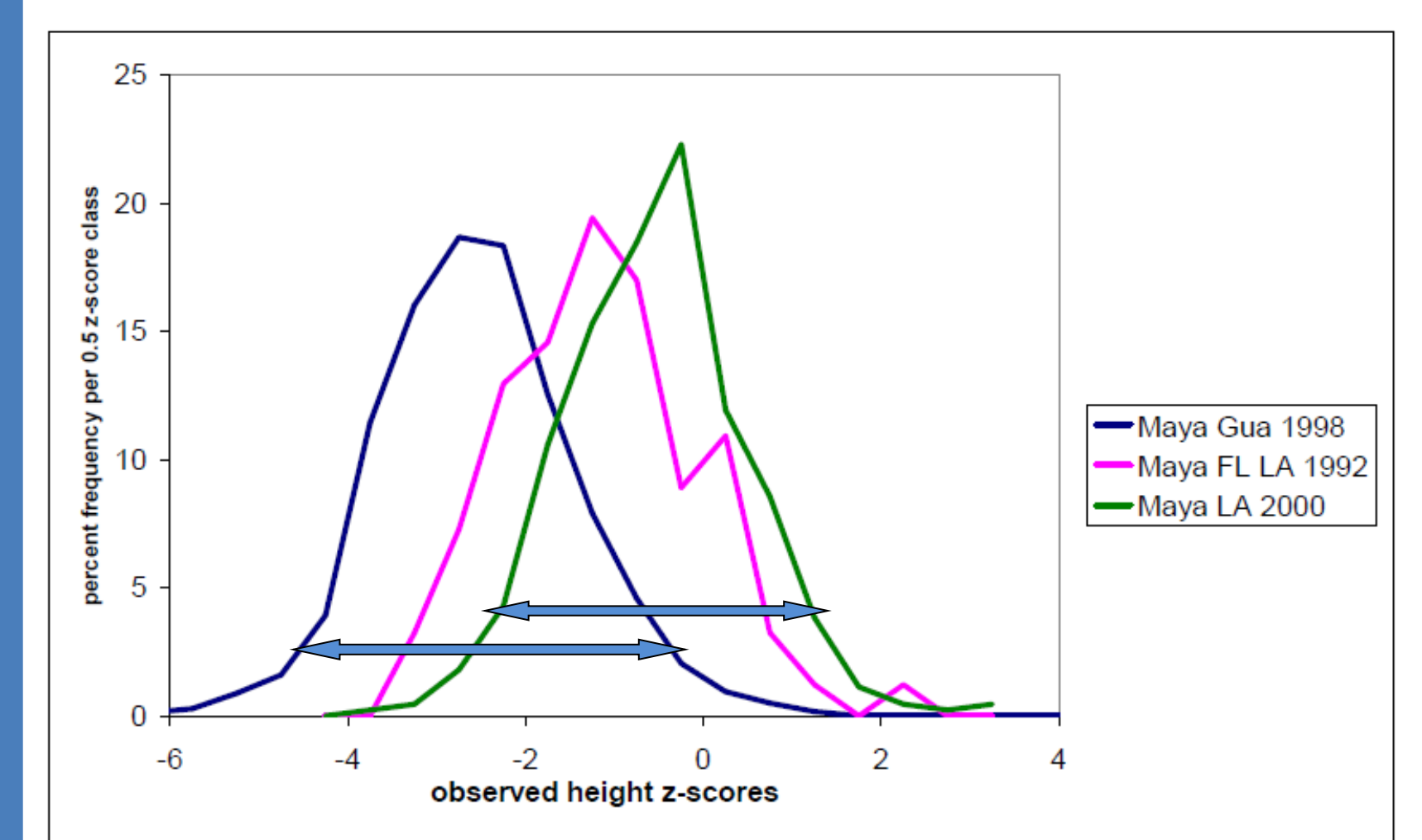
Regardless of mean population height, height SD stay constant.



Height of Swiss conscripts (Schaffhausen)
(after Rühli & Woitek, 2007)

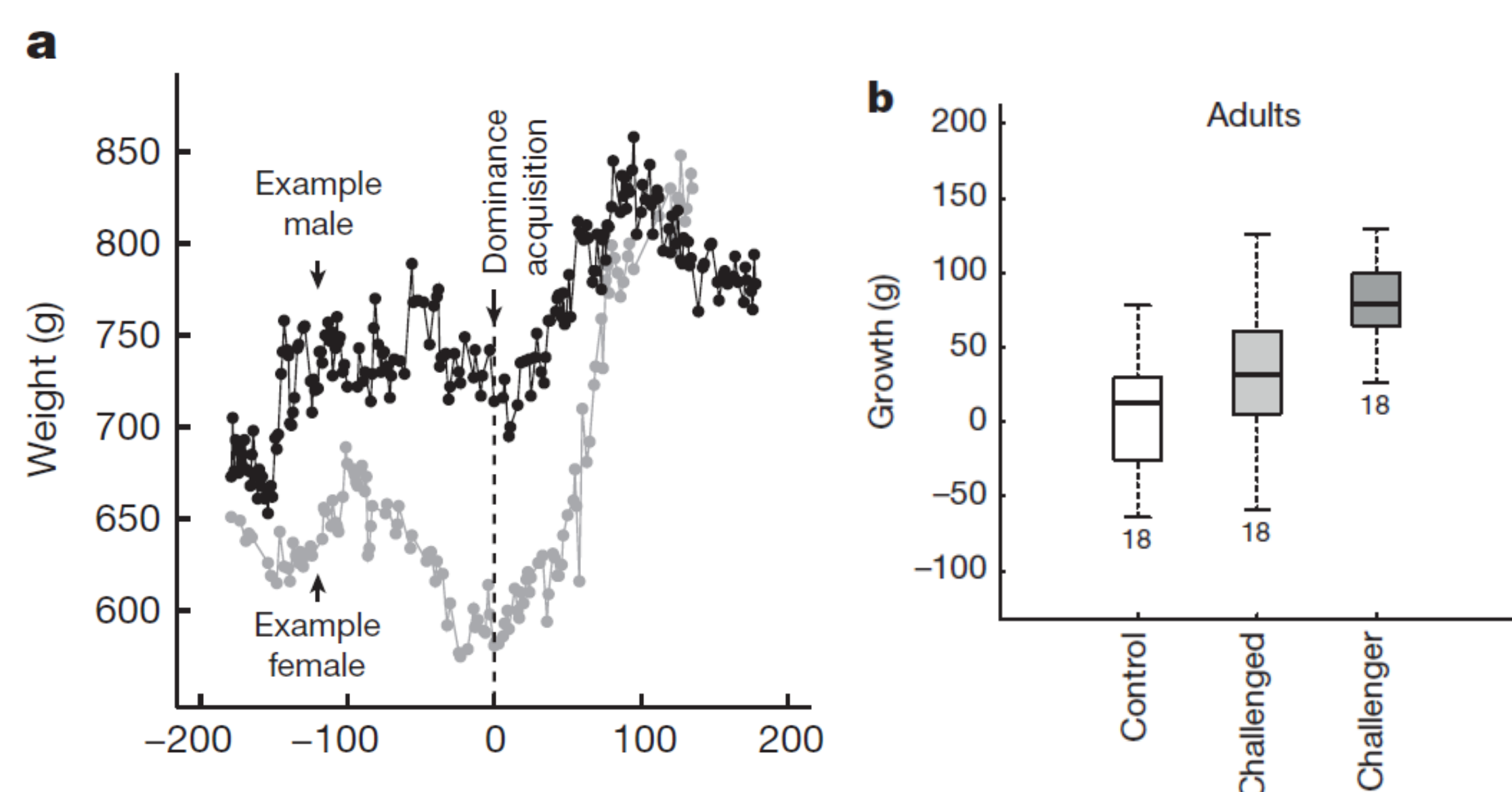


Height of historic European conscripts
https://commons.wikimedia.org/wiki/File:PSM_V51_D207_Percentage_distribution_of_stature.png



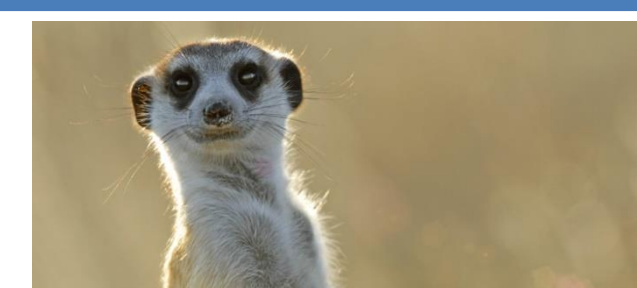
Height of Maya children from Guatemala, and migrant Maya children (US).

Evidence of strategic growth adjustments in meerkats (Huchard et al. 2016)



1. Dominance acquisition results in growth stimulation.
2. Stimulated growth of subordinate group members is perceived as social challenge.
3. Social challenges additionally stimulate growth in dominant members.

(meerkats continue growing after final position within the social network)



Translation to Humans

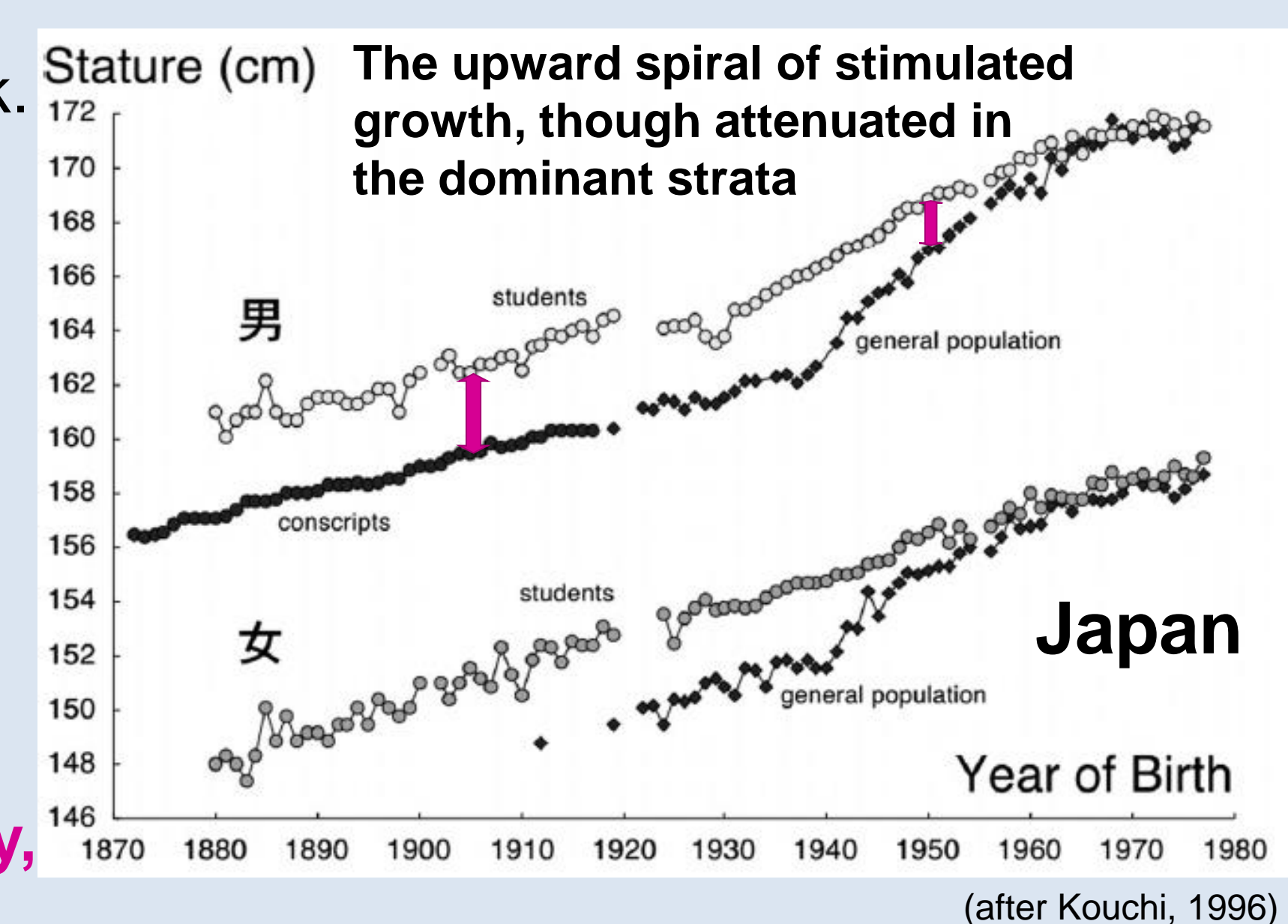
We are not meerkats: Humans reach maximum height before achieving final social position.

Adult height is the "frozen perception" of an adolescent's idea of his or her future position within the social network.

1. Perceived dominance corresponds to tall height targets and results in growth stimulation towards these targets (**stature signals status**).
2. When democratization and periods of political turmoil facilitate upward mobility of the lower social strata, adolescent members of these strata readjust their height targets and gain in adult height (**Strategic growth adjustments**).
3. Stimulated physical growth of lower class members is perceived as social challenge by the dominant class leading to further growth stimulation of the already tall adolescent members of the dominant class.

Consequences:

Transition from non-democratic stationary (eg. feudal) societies to societies that allow for **upward social mobility**, results in **upward spirals of stimulated growth** of both the lower and upper social class



(after Kouchi, 1996)

References:

Huchard E et al. Competitive growth in a cooperative mammal. Nature 2016;533(7604):532-534. Hermanussen M & Scheffler C. Stature signals status: The association of stature, status and perceived dominance - a thought experiment. Anthropol Anz 2016;73: 265-274.

Kouchi, M. Secular change and socioeconomic difference in height in Japan. - Anthropol Sci 1996;104: 325-340. Rühli F & Woitek U. Rekrutierung: Medizinisch-sozioökonomische Forschung. Allg Schweizerische Militärzeitschrift 2007;173:29-30