

# How do Novelties in Cycle Design Compare?

## A German doctor describes his measurements on a J-wheel

Hans-Erhard Lessing

**A**FTER THE FIRST NEWS of the J-wheel in 1921, German popular-science magazine *Umschau* (Look Around) published the following report<sup>1</sup> by Dr Albert Gmelin, a country doctor from near Stuttgart. He belonged to the more affluent middle class of post-war Germany that could afford a more costly bicycle, but not yet an automobile. Besides, he provided an original test of the hill climbing ability of the J-wheel when compared to the bicycle of old. For a history of the J-wheel see my paper<sup>2</sup> in *Cycle History* vol 9. In addition to the translation, photos are presented of his family, courtesy of his daughter, Dr Ursula Gmelin.

**T**O MANY A READER of the *Umschau*, having read of the J-wheel a year ago<sup>3</sup>, it might be worthwhile to learn how a comparison between this new two-wheeler and a conventional cycle turns out. Anyone who had hoped and expected to achieve the impossible with the J-wheel, without previous experience, and disregarding his age and insufficient strength, must have felt just as disappointed as the woman at the opticians asking for spectacles hoping to be able to read with these without ever having learned to read.

To make a comparison between a proven thing and a novelty within the same field, one must have above all test objects of the same standard and kind. Following this premise I obtained a well running cycle of modern design with 4-speed (Fichtel & Sachs) hub, shortly after I had gained my first experience on a newly

acquired J-wheel. It wasn't possible for me to make the weights of the cycles completely equal. With rider and medical equipment, the J-wheel weighed 111kg, the conventional cycle 105kg. The hilly terrain around here is suitable for test rides just as little as it is for cycle rides in general. All compari-

1 A Gmelin: Wie bewähren sich Neuheiten im Fahrradbau?, *Umschau* (Frankfurt) 1922, pp234-235

2 H E Lessing: The J-Wheel. Streamline Pioneer Paul Jaray's Recumbent, *Cycle History* vol. 9 (San Francisco 1999) pp141-150. See also my German paper excerpted at [www.j-rad.ch](http://www.j-rad.ch)

3 A Buettner: Eine umwälzende Erfindung im Fahrradbau, *Umschau* (Frankfurt) No18, 1921



Fig. 1 Albert Gmelin on J-wheel before the state mental asylum of Stetten, about 1922/3

sons were ridden in good dry weather on roads completely free of dust and stones. Especially suitable for this was the end of the mainly dry year of 1921. Street gradients were obtained from road-building offices in Esslingen on Neckar, Cannstatt and Waiblingen:

1st distance of regular gradient of 2%, 2km long

2nd distance, ascent and drop of 3.8–7.7%

3rd distance of irregular incline of 6–12%, 2,200 metres

The following numbers represent the average of 25 values achieved under the above conditions

# 1 Uphill Rides

a) On small incline (1) 2% slope, 2km					
J-wheel	av. Ratio 300–350	smallest ratio 330–360 treads/km	breaths 16–18/min	pulse up to 80	1 km in 3–4 min
Cycle 4-speed	2nd, 3rd 200, 240	smallest ratio 350 treads/km	breaths 16–18/min	pulse up to 80	1 km in 3–4 min
b) On larger incline (2) 3.8–7.7%, 2,600/2,886m					
J-wheel low notch	slow treading quick treading	350 treads/km 400 treads/km	breaths over 20 breaths 20–22/min	pulse up to 90 pulse up to 85	1 km in 4min
Cycle 4th gear	constant cadence	350 treads/km	breaths 20–22/min	pulse 92	1 km in 3.5min
c) On strong incline (3) 6–12% slope, 2,200m					
J-wheel low notch	1st part: 1,500m at 6–7%	350–380trs/km	Breaths @350 trs 18–20/min @380 trs 16–19/min	pulse ave 88 pulse ave 80	2,200m in 20min
	2nd part: 700m at 10–12%	400–450trs/km w/o dead centre	firstly 20–22 last 100m 25 breaths	pulse not above 100 pulse 108	1 km in 9.9min
Cycle 4th gear	1st part: 1,500m at 6–7%	350trs/km regular ride no problem with dead centre	breaths 20–22/min	pulse ave 100	2,200m in 22min
	2nd part: 700m at 10–12%	after short treading dead centre, hub fails	pushing: 28 breaths	finally pulse 118	1 km in 10min



Fig. 2 Albert Gmelin and wife Margarete on J-wheels, about 1923/24

## 2 On the Flat

With its easy change of gear, its seat back and completely ergonomic seat, there is less tiredness due to the use of

the essentially larger and more powerful thigh muscles that mainly do the work on the J-wheel. The rider on the modern cycle strains mainly the calf muscles

which get tired more easily and are supplied with less blood.

## 3 On Downhill Rides

The low seat of the J-wheel proves its worth by enabling the rider to come to an immediate standstill without difficulty by simply putting both feet onto the road and by

Dr Albert Gmelin (1891–1968) followed in the footsteps of his father, a country doctor, and studied medicine at the universities of Tübingen and Berlin. His thesis was at the University of Freiburg. Having served as a military doctor during World War I, he settled in Stetten near Stuttgart as the local doctor. Soon he was elected medical director of the state mental asylum located there. During World War II, he served as a doctor in the air force. When the Nazi euthanasia programme began, he struggled for the lives of the asylum inmates and even entered the Nazi party to back this up, only to be expelled some month later for exactly that reason. His technical interest was documented by having the first X-ray equipment in the area and the first radio receiver. Using a Mercedes-Benz diesel car after the war, he got bronchial pneumonia during house-calls, and died of the disease.



Fig. 3 Margarete Gmelin and sister-in-law Dora Hanle, born Gmelin with children on J-wheels. Prof. Will Hanle taught physics at the University of Giessen

energetic use of the two rim brakes. With adequate background knowledge, he need not ride as cautiously as on the rather higher cycle and feels safer. The inventor of the running machine (ie Drais) would be surprised and pleased, how his former invention comes into application with the J-wheel. In an opposite sense, when steeper stretches or bad roads (slipperiness due to wetness, ice or snow) force the rider to use both feet accordingly, good footwear and well-nailed shoe soles are a prerequisite!

In winter 1921/22, in deep snow, such riding down into the valley proved a success. At breakneck speed (1km in 1min, ie 38mph) I could cover dis-

tances that would have been impossible with the cycle of old and laborious and exhausting on foot.

#### Summary

Under conditions as comparable as possible, a slope of 9 to 10% turned out easy for a J-wheel, but for a cycle of conventional design it was just still surmountable without effort. The limit was at 10% for the latter, whereas the J-wheel surmounted a slope of 13% without excessive effort. On shorter grades the power limit of the J-wheel would be 15% to 16% according to my experience. On downhill rides the new J-wheel is in all respects superior to the present cycle with its high design.