

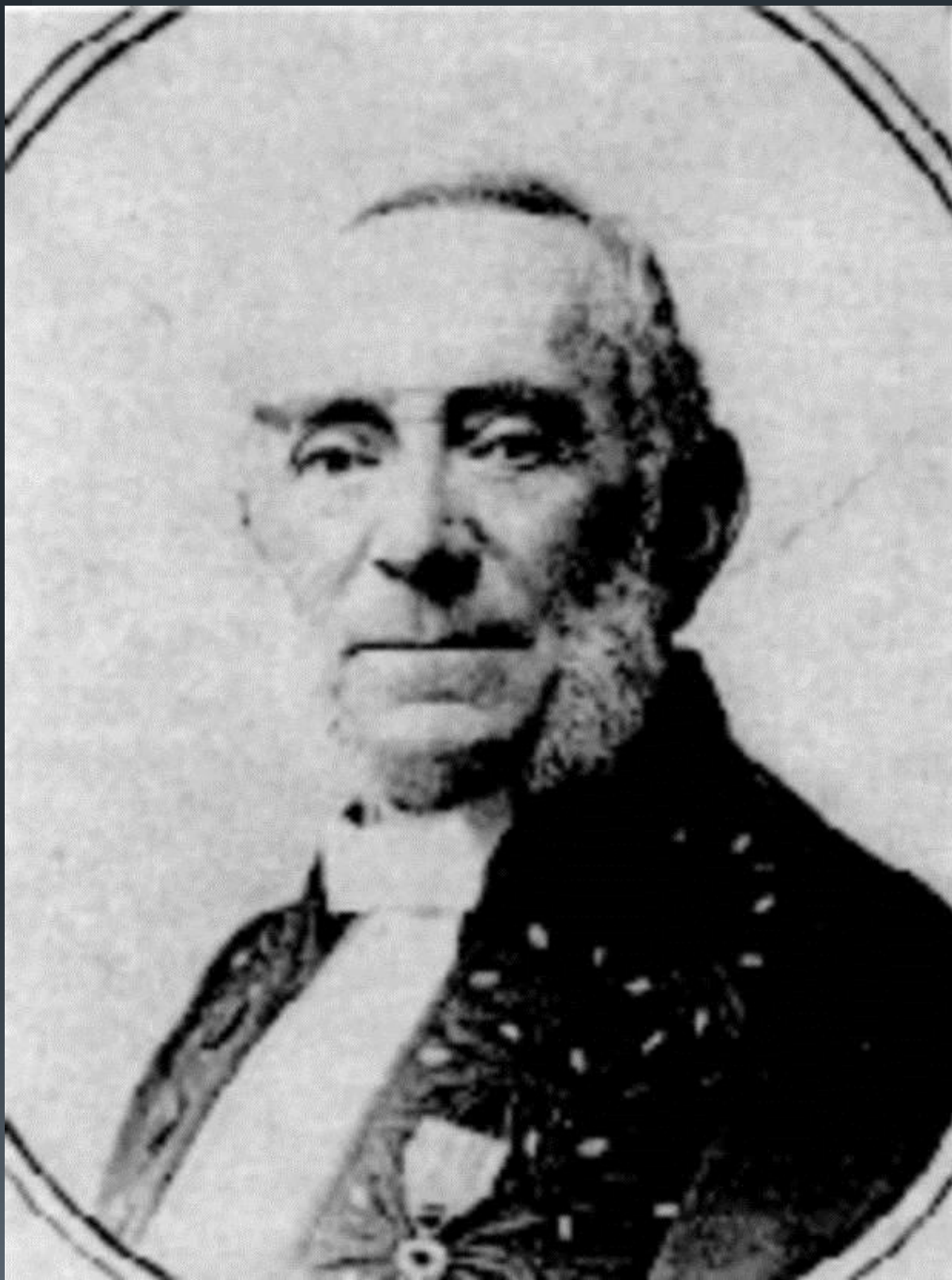
The Quantitative Characteristics of the Upswing and Downswing Phases of Kondratieff Waves and the Juglar Cycles

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Medium-term or Business Cycles

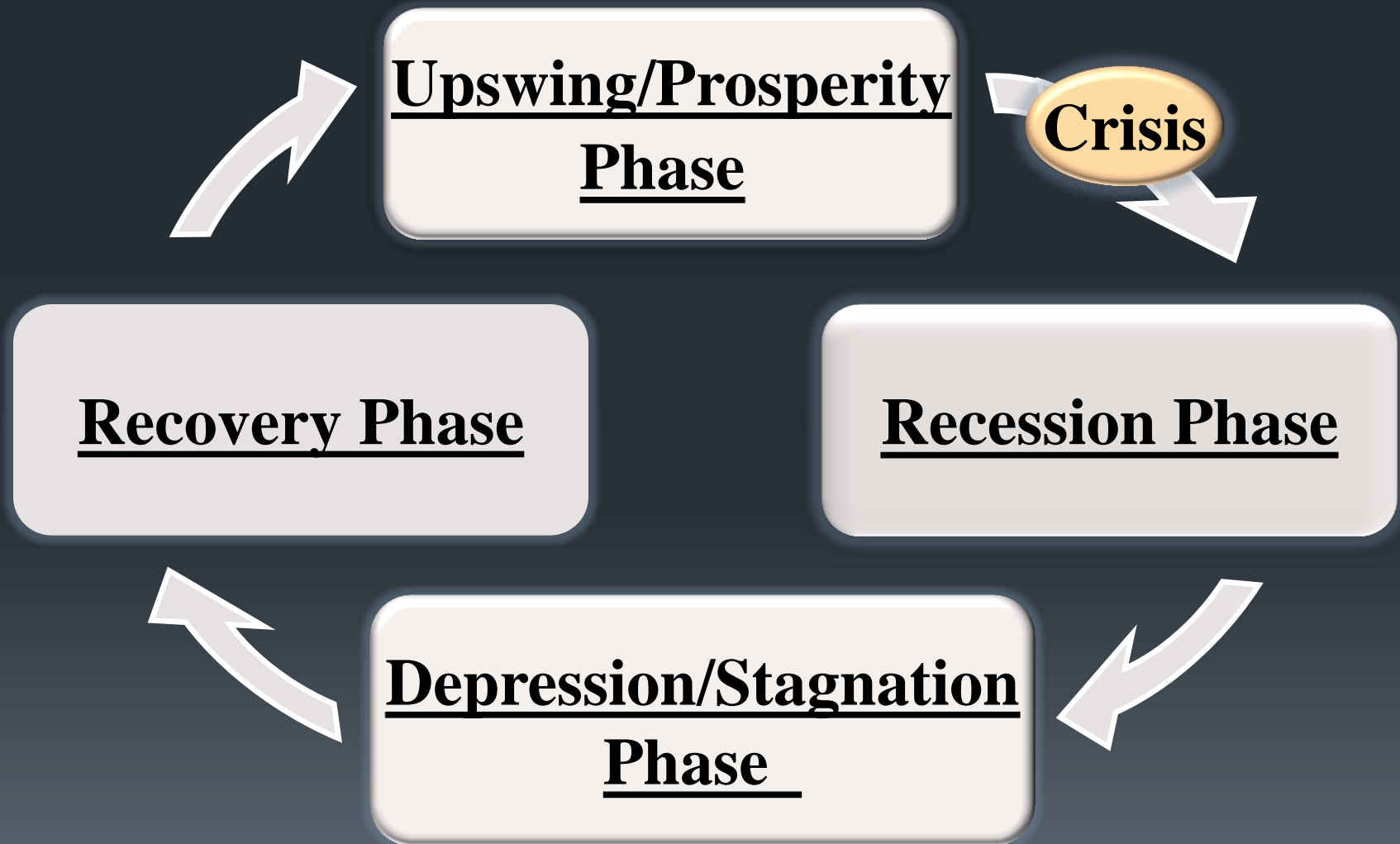


- Medium-term or business cycles are the most known types of economic cycles. Their length is 7–11 years.
- The key feature: A fast economic growth (sometimes boom) is sharply changed by a collapse and recession.
- The main causes of crises and recessions are the overcredit and overinvestment.



Clément Juglar
1819 – 1905

The Model of a Juglar Cycle





Nikolay Kondratieff
1892 –1938

Table. 1. Kondratieff Waves and Their Phases

No K-Wave	K-Wave Phase	Date of the Beginning	Date of the End
I	A: upswing	The end of 1780s – the early 1790s	1810–1817
	B: downswing	1810–1817	1844–1851
II	A: upswing	1844–1851	1870–1875
	B: downswing	1870–1875	1890–1896
III	A: upswing	1890–1896	1914–1928
	B: downswing	1914–1928/29	1939–1947
IV	A: upswing	1939–1947	1968–1974
	B: downswing	1968–1974	1984–1991
V	A: upswing	1984–1991	2006–2008
	B: downswing	2006–2008	2020s?

Explanations of K-Waves

- Monetary theories.
- The dynamics of capital investments.
- The dynamics of innovations.
- Cycles of military activity.
- Alterations of business generations.
- Class struggle.
- Connection with the cycles of hegemony.

However, none of these explanations appears to be completely satisfactory or universally accepted.

Table. 2. K-Waves and Technological Systems

Wave	Date	New Technological System
The first wave	1780s–1840s	of textile industry
The second wave	1840s–1890s	of railways, coal and steel
The third wave	1890s–1940s	of electricity, chemistry and heavy engineering industry
The fourth wave	1940s – the early 1980s	of automobile, artificial material, electronics
The fifth wave	1980s – ~2020s	of microelectronics, personal computers
The sixth wave	~ 2020–2070	biotechnologies, nanotechnologies, medicine, new information and cognitive technologies

The Connection between K-Waves and Juglar Cycles



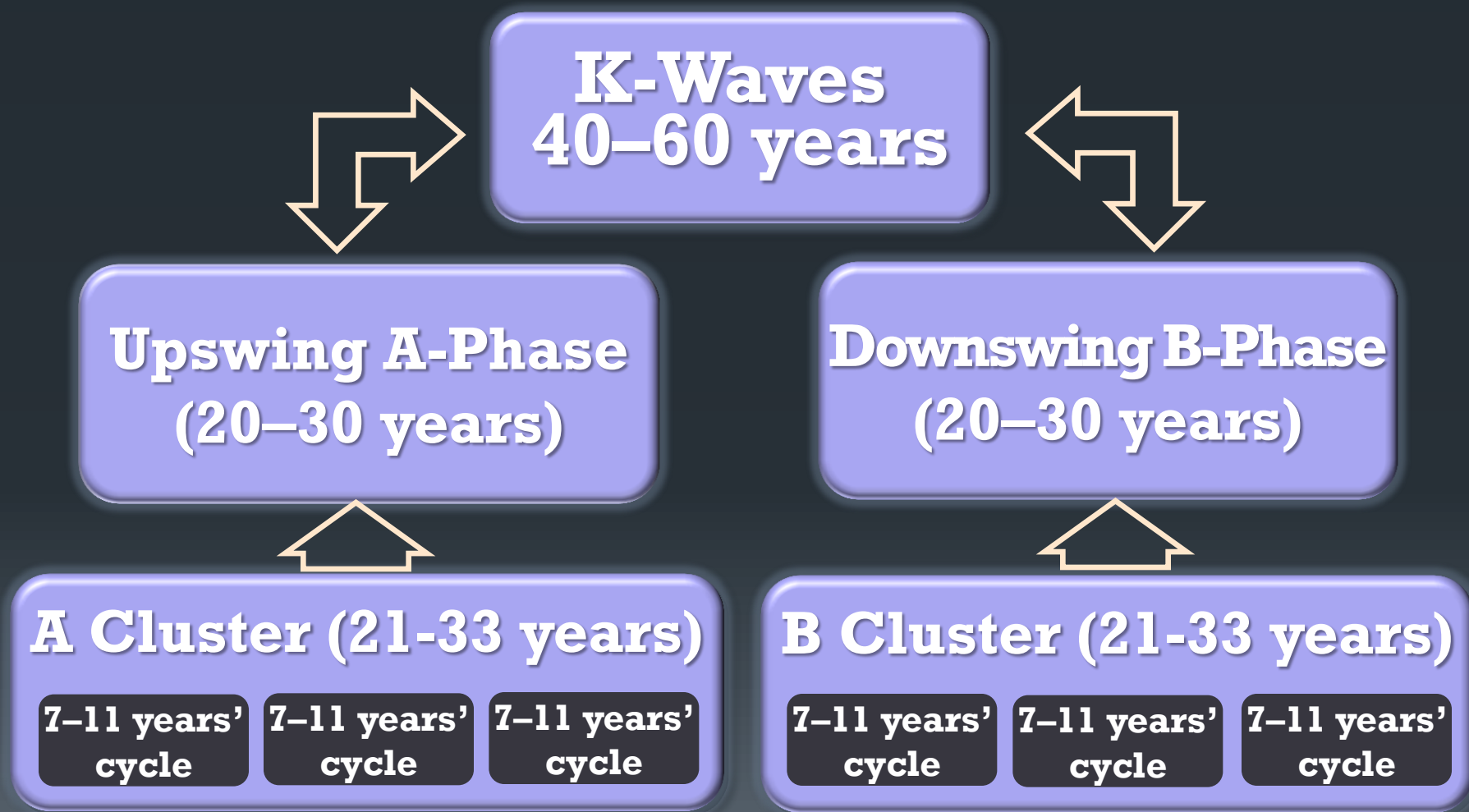
- There is only one factor which can really determine the stable duration of Kondratieff waves and their phases. **This factor is the Juglar cycles.**
- The relatively regular periodicity of the K-waves' phases is determined by the relatively stable duration of J-cycles, whose ternary chain-clusters are 20–30 years in length.

The Connection between K-Waves and Juglar Cycles

The correlation between the duration extremes of K-waves (40–60 years) and those of Juglar cycles (7–11) are very close:

$$7 : 11 = 0,64 \sim 40 : 60 = 0,66$$

Clusters of Juglar Cycles and Stable Duration of K-waves and Their Phases



Two Types of Juglar Cycles

The duration and relative regularity of K-waves' phases is determined by the character of the adjacent chains, or **clusters**, of Juglar cycles.

Cluster A is a chain of several upswing Juglar cycles characterized by strong rises and relatively short depressions.

Cluster B is a chain of several downswing Juglar cycles characterized by weak rises and lengthy depressions.

Diagram 1. The Length of A- and B-Phases of K-Waves in years

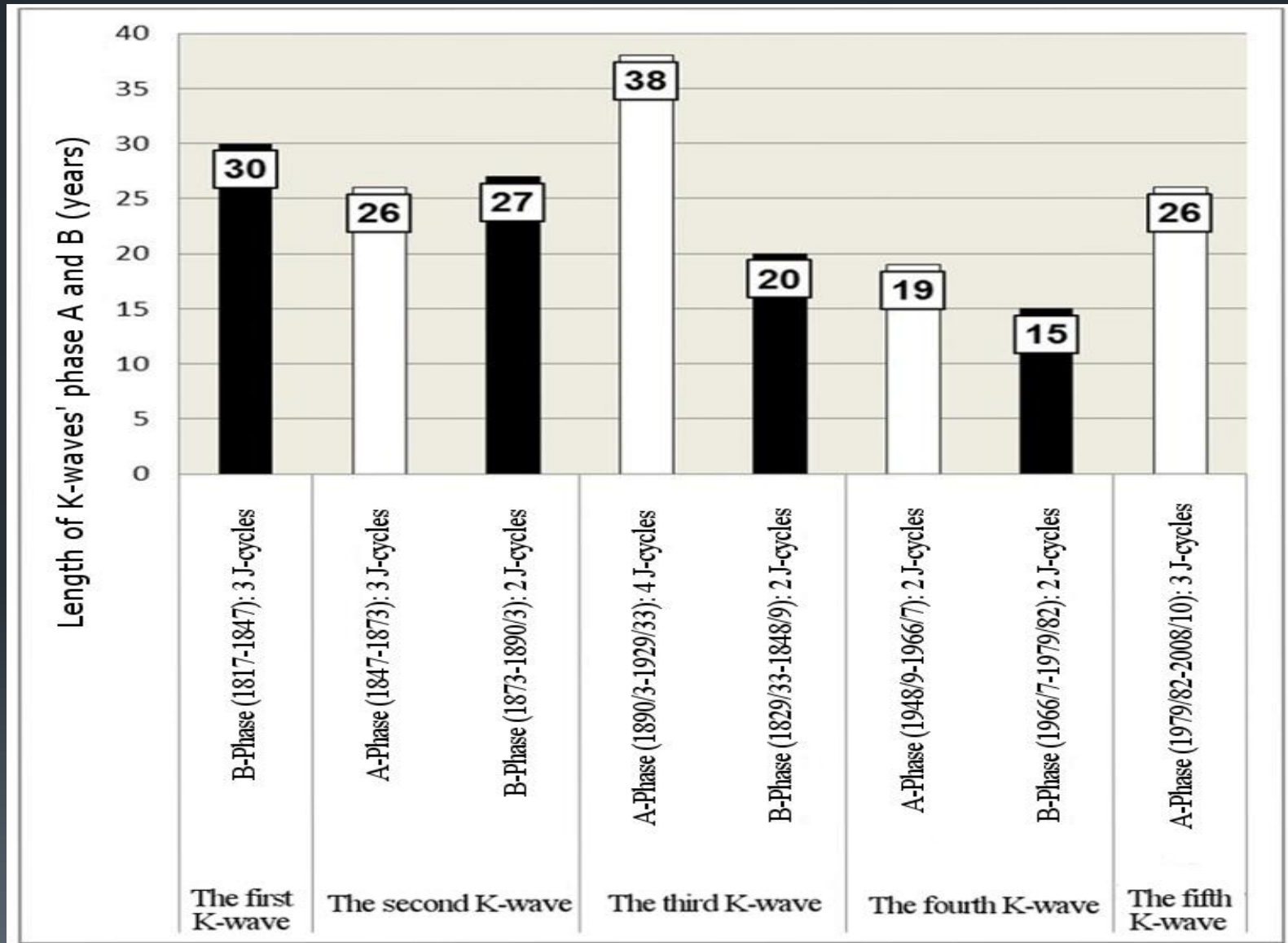
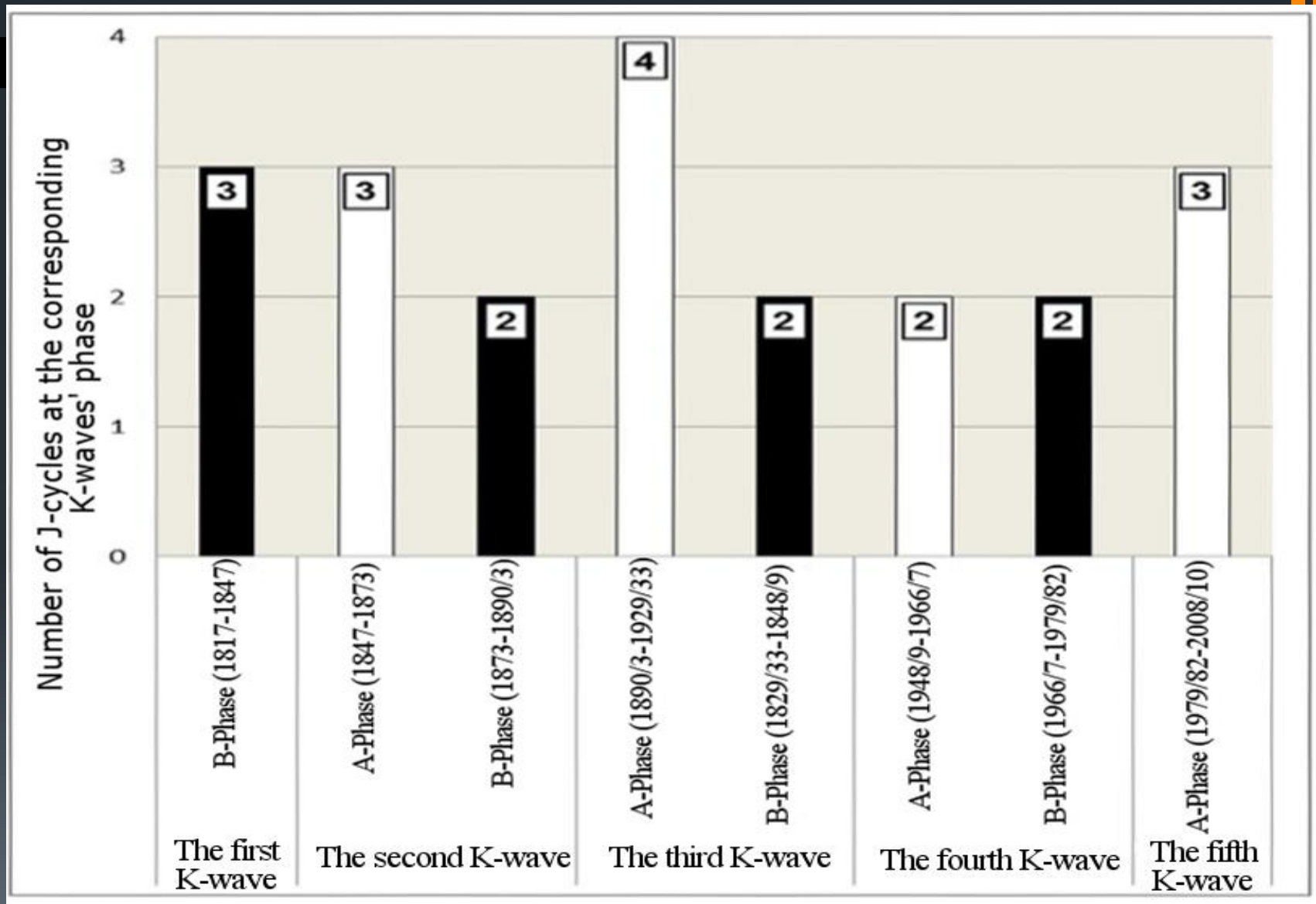


Diagram 2. The Length of A- and B-Phases of K-Waves in 'Juglars'



Duration of Juglar Cycles at A-Phases and B-Phases

- The **average length of a J-cycle at the A-phase** within the whole period of a K-wave is about 8–9.1 years.
- The **average length of a J-cycle during the B-phase** within the whole period of a K-wave is about 10.2–10.3 years (10–20 % longer than during A-Phases).

Multiple Proportion of K-Waves' Phases to Juglar Cycles

- Whatever duration of phases, we can see **multiple proportion of K-waves phases to Juglar cycles**. It proves the deep connection between Juglar cycles and K-waves. We can measure the length of K-waves and their phases in 'juglars'.
- The number of 'juglars' in different waves and phases fluctuates from 4 to 6 and from 2 to 4, respectively.

The number of depressive or active years in economic terms



- Medium cycles of A-phases are economically active cycles of growth. And medium cycles of B-phases are depressive ones connected with restructuring of economy.
- Thus, at A-phases upswing years considerably outnumber depressive years. On the contrary, depressive years surpass the number of economic upswing years.

Table. 3. The correlation between the years of upswing and depression at the A-and B-phases according to Spiethoff

Periods	Years of upswing	Years of downswing
Downswing wave of the long cycle from 1822 to 1843	9	12
Upswing wave of the long cycle from 1843 to 1874	21	10
Downswing wave of the long cycle from 1874 to 1895	6	15
Upswing wave of the long cycle from 1895 to 1912	15	4

**Table 4. The correlation between the years
of upswing and depression
(upswing : depression)**

Economist	A-Phase	B-Phase
Spiethoff	2,5 : 1	0,6 : 1
Mitchell	2,7 : 1	0, 85 : 1
Hansen	3 : 1	0,75: 1

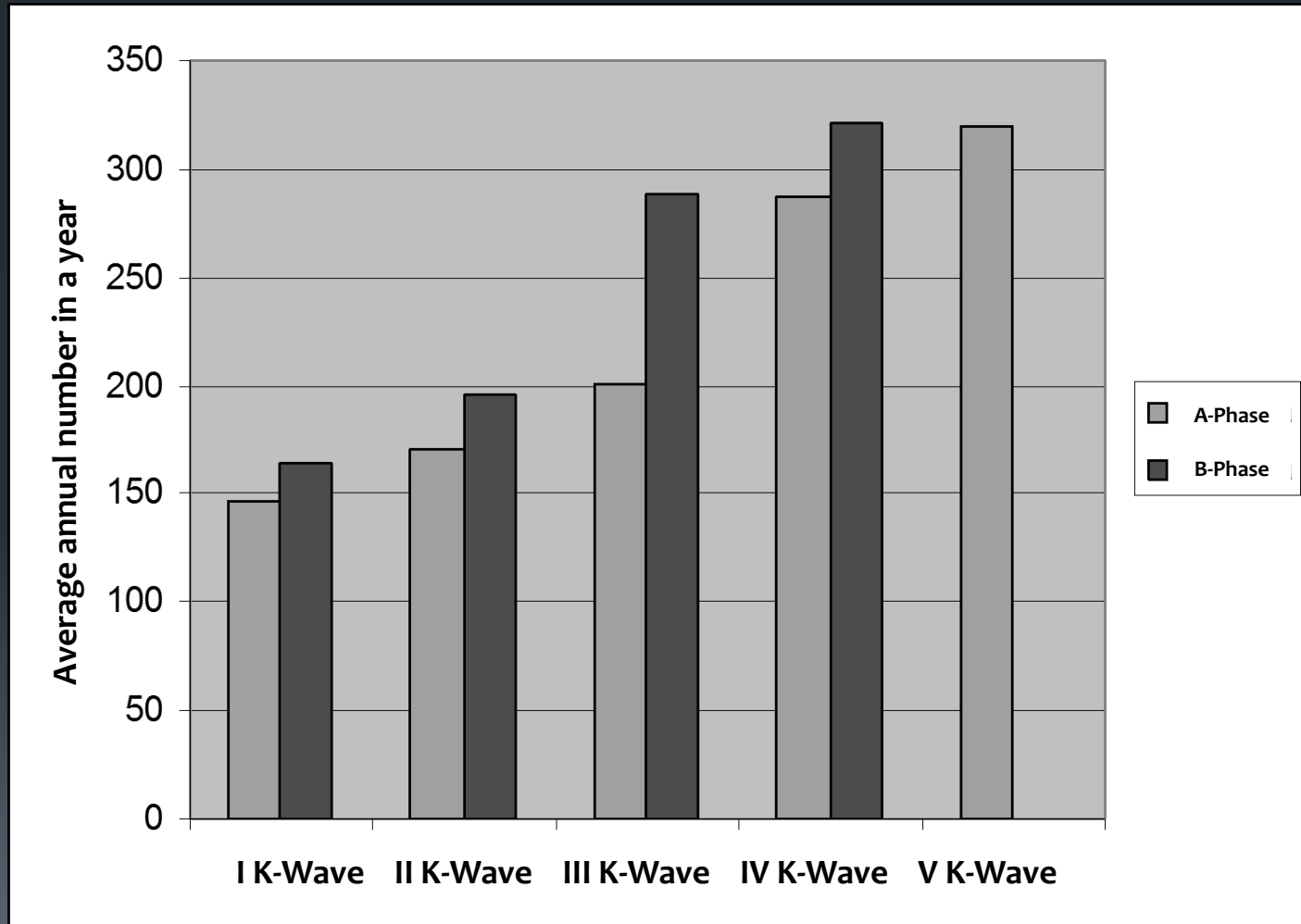
The Logic of changing K-Waves' phases



- During the upswing A-phase of a K-wave a rapid expansion of economy inevitably leads a society to the necessity for changes.
- But the opportunities for a society to change lag behind the demands of economy.
- That is why the **development inevitably changes into B-phases**, during which the crisis and depressive phenomena impel deep transformations.

Average annual number of the U.S. Congress session days correlated with the K-waves and their phases

(allowing for a five-year delay to comprehend a situation and excluding the Civil War and the Reconstruction years (1862–1869))





Thank you for attention!

Examples of the Connection between K-Waves and Juglar Cycles

- The most common timing of Kondratieff waves with their phases and the generally accepted timings of Juglar cycles.
- The change of fundamental innovations can occur in no other way but through medium-cycles, including their booms, crises and depressions phases.
- **The correlation between the duration extremes** of K-waves (40–60 years) and those of Juglar cycles (7–11) are very close:

$$7: 11 = 0, 64 \sim 40: 60 = 0,66$$