Aging of populations

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Summary

1/ Origins and determinants of aging

2/ Projections for the next 50 years

3/ The role of migrations

4/ Consequences for family structures

1/ Three causes to the aging of a population

- A decline in fertility
- A decline in mortality, *if the rates above the median age of the population are declining*
- Irregularities in the age pyramid

>>> Example : two possible paths for the French population between 1740 and 2000

Figure 13 : French population in 1740

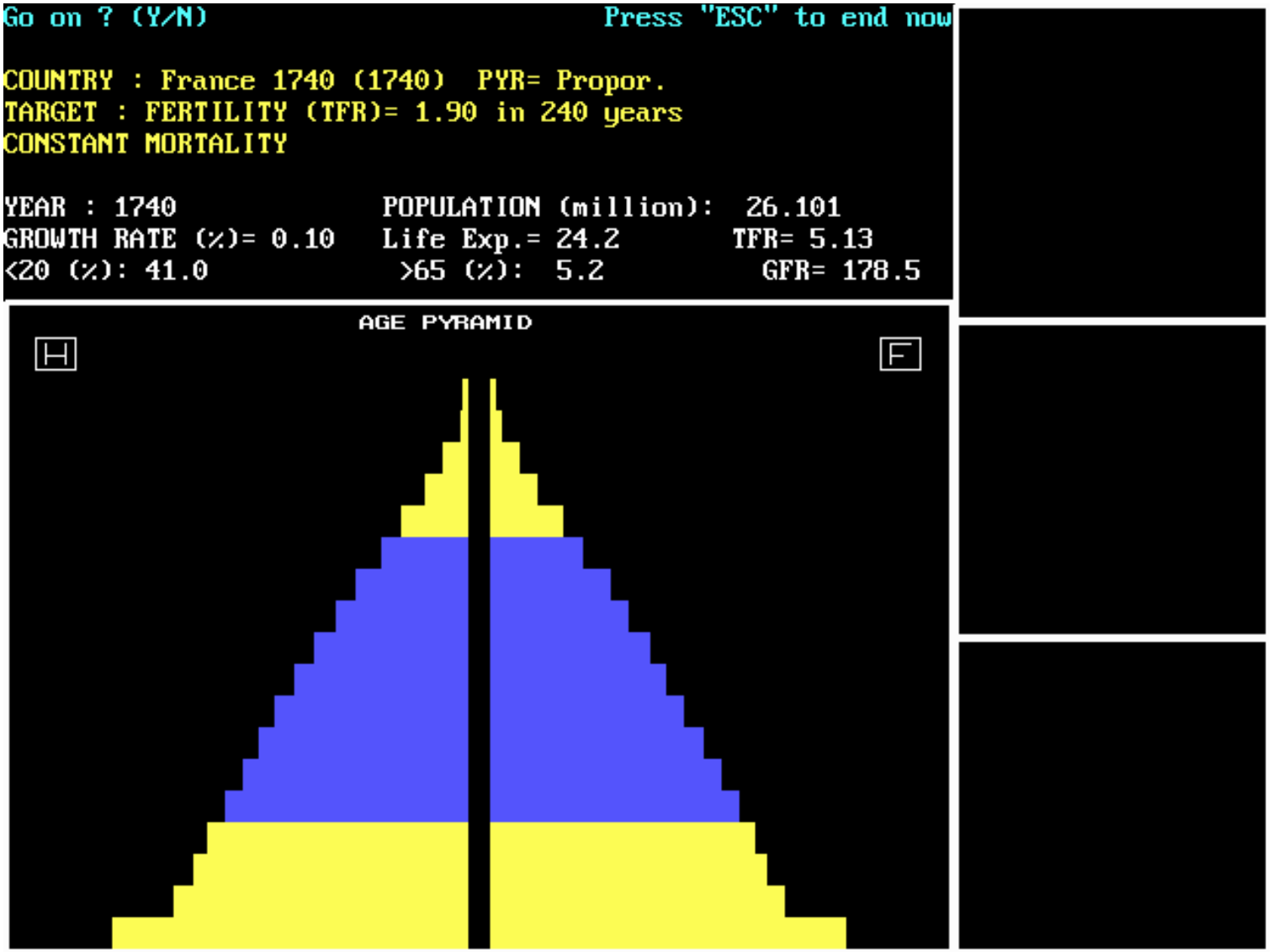


Figure 14 - French population in 2000: fertility declining from 5.1 to 1.9, constant mortality

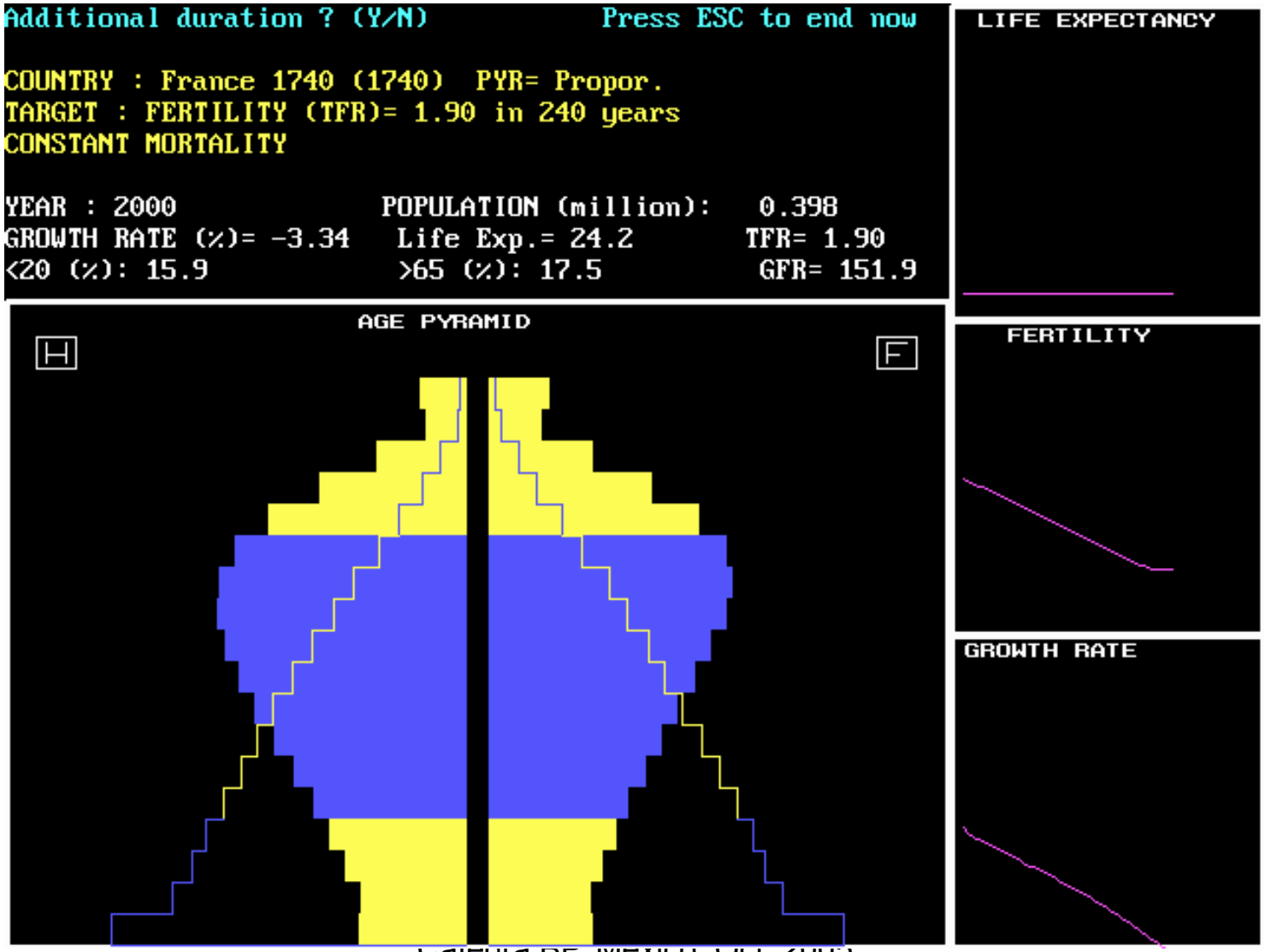


Figure 15 - French population in 2000: life expect. rising from 24 to 79 yrs, constant fertility

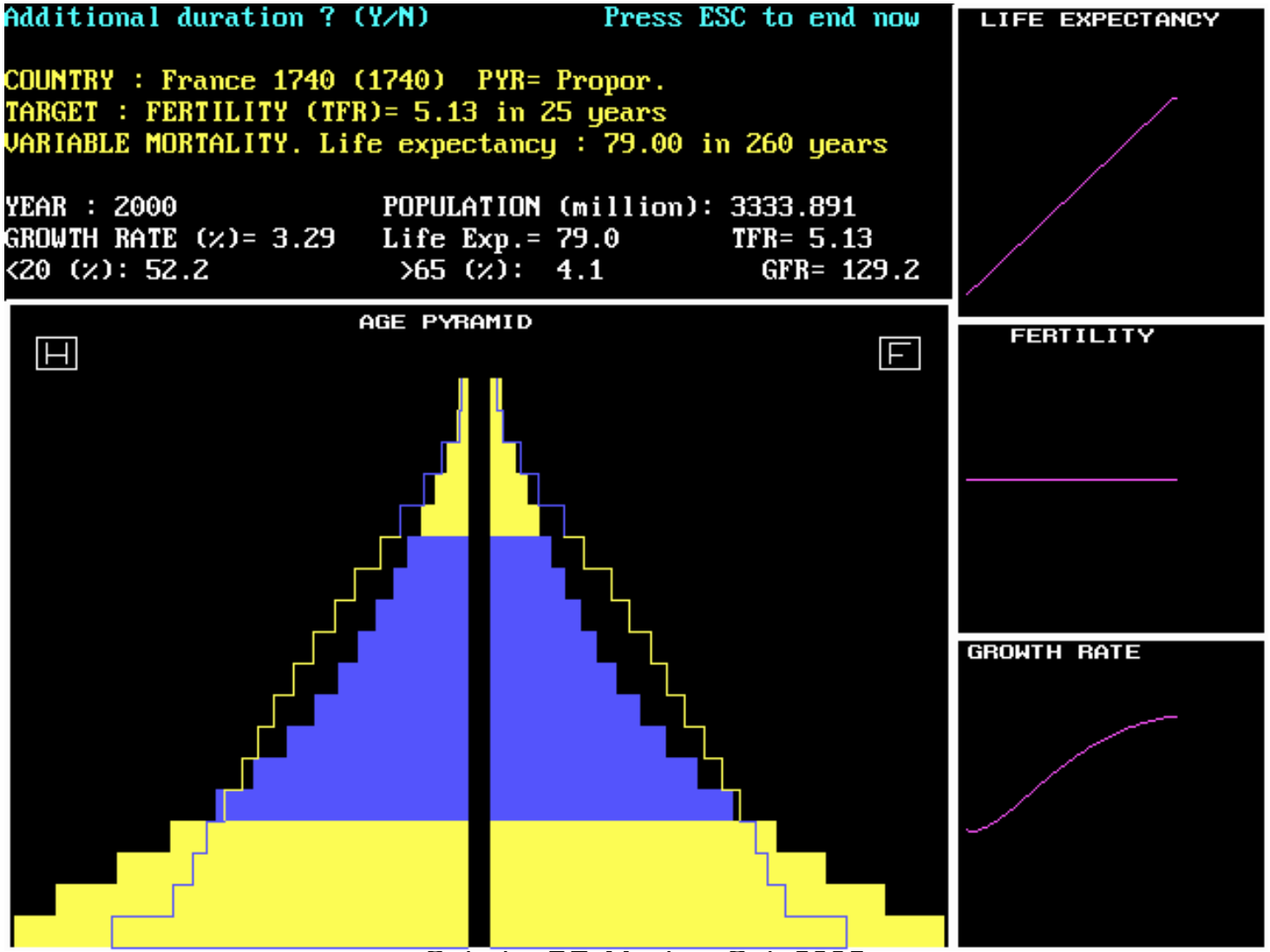
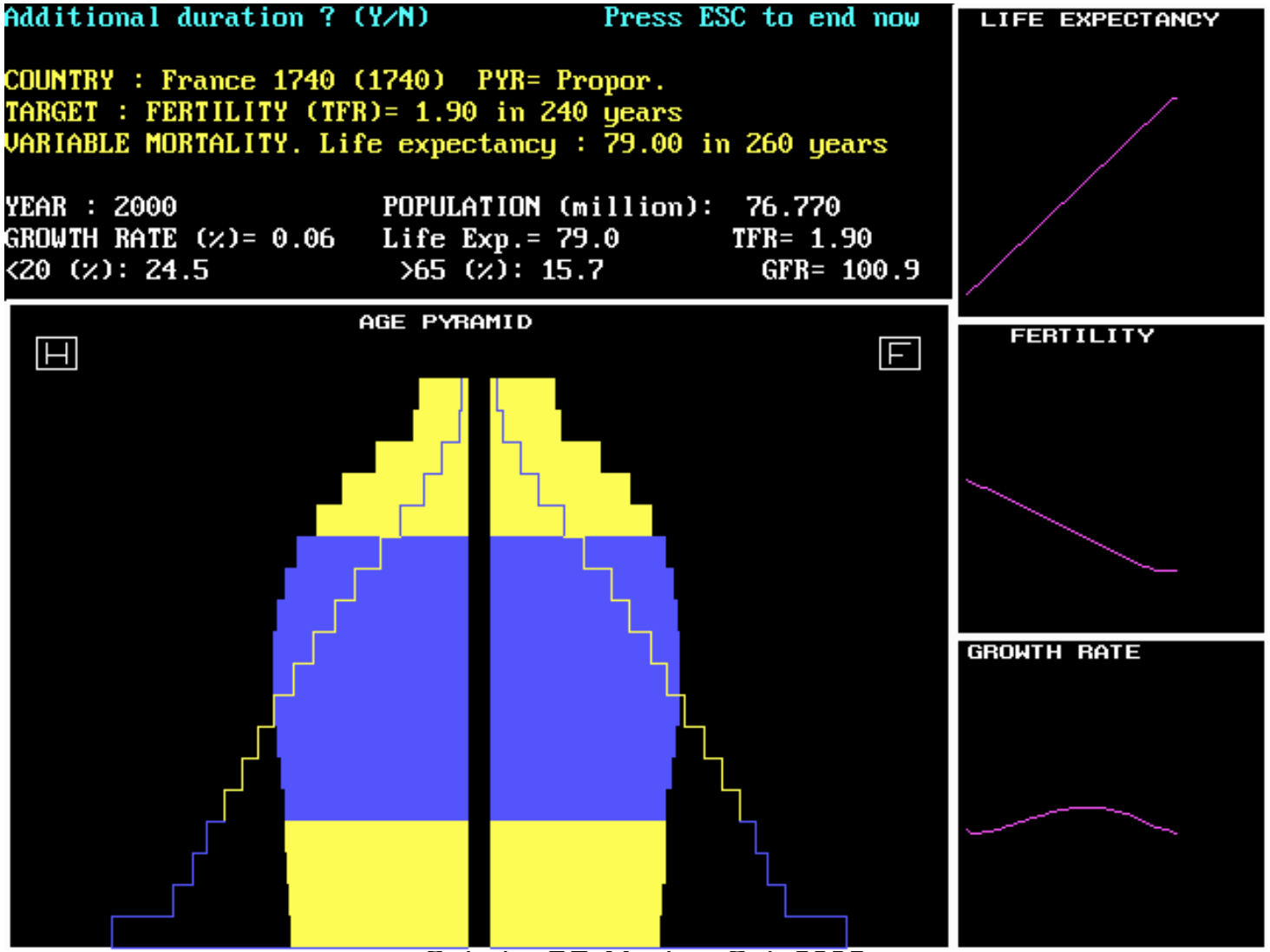


Figure 16 - French population in 2000: fertility and mortality declining to current levels



Conclusions for the past (a)

- As long as mortality and fertility remained at high levels, the age structure of the population did not changed (a general result for « stable populations »), with no more than 5 % of people aged 65 yrs or more.

- The decline of fertility has been responsible for the aging of European populations,France having opened the way: 5,7 % of 65+ in 1800, 8 % in 1900, 11 % in 1950.

- Since 1950, the decline in mortality beyond age 60 is accelerating the aging process.

(b)

- In the LDCs, the decline in mortality has rather increased the proportion of young persons, as long as fertility remained constant.

- But the aging process has now started in most of them. On average, the proportion of 65+ rised in these countries from 3,8 % in 1970 to 5,1 in 2000, and will be round 14 % in 2050.

Back to Bourgeois-Pichat…

- A famous paper (*Population*, 1970) illustrated the inertia accumulated in a « young » pyramid.
- Projecting the population with a rate of growth declining to zero in 40-50 years leads to enormous fluctuations.
- Projecting with a total fertility declining to replacement level in the same period creates no fluctuations, but the population is bigger at the end.
- *>>>The example chosen was the Mexican population*

(BP)

- Using our *Pyramid program*, starting (as BP) in 1960, assuming that the life espectancy will be 78.1 yrs in 2010, we find:

- If the growth rate declines to 0 in 2010:
  a TFR of 0.66 at that date (fluctuating !),
  8.2 % of 65 yrs+, 19% below 20 yrs,
  a population of 78 millions (constant afterwards);

- If the total fertility rate declines to 2.1 in 2010:
  a rate of growth of 1.4%,
  5% of 65+ yrs, 37 % below 20yrs,
  a population of 127 millions (finally 190)

2/ Projections for the next decades

During the next decades, the aging of european populations will be mainly due to:

- The decline of fertility since the 1960s,
- **and** the decline in mortality rates at older ages.

According to the UN projections, between 2000 and 2050, the proportion of 65+ will rise in Europe from 15 to 28 % (medium variant) or to 32 % (low variant)

In Europe, aging is an inescapable process, because two of its three causes result from ***past*** evolutions: the long decline of fertility, and the disruption due to the baby-boom.

- *If mortality and fertility remained at their curent levels, the proportion of 65+ in the French population would rise from 16 to 23 % in 2050; when the effects of the baby-boom will have disappeared, the proportion will stabilize at 21%.*

In LDCs, the effect of a declining fertility will fully operate.

- The aging process will be further stimulated by the increase in the life expectancy. Keeping fertility constant, the proportion of 65+ will reach (in France) 29 % in 2050.

- The proportion will be 25 % in Mexico at the same date.

Are long term projections useful?

- The United Nations have published demographic projections extended to… 2300.

- The use of such an exercise is very limited. It is true that it takes sometimes more than one century for a population to reach a stable state, but:

  - the range of hypotheses must be kept very small: small differences in fertility, e.g., have an enormous impact on the population size after 2 or 3 centuries. In practice, the UN experts are assuming a constant fertility after about one century at most;

  - over two or three centuries, who knows what is going to happen to fertility, mortality and migrations in any single country…

…/…

- if we are only interested in the properties of stable states, the theory can tell us and we do not need thousands of projections.

- e.g. on the long range, we know that any value of fertility *below* the replacement level will bring the population to… zero, and that any value *above* that level will result in a demographic explosion;

The next Table gives an example of the effects of fertility hypotheses on population size after only 1.5 century.

The effect of fertility hypotheses on population size in 2150

Scénarios de fécondité :

Année ISF :	« Moyen » (2,06)	« Haut » (2,58)	« Haut/Moyen » (2,30)	« Bas/Moyen » (1,90)	« Bas » (1,57)	« Remplacement instantané » (2,09)
1950	2,5	2,5	2,5	2,5	2,5	2,5
1995	5,7	5,7	5,7	5,7	5,7	5,7
2050	9,4	11,2	10,8	8,0	7,7	8,4
2100	10,4	17,5	14,6	7,2	5,6	9,0
2150	10,8	27,0	18,3	6,4	3,6	9,5

3/ Can migrations slow down the aging process?

- The answer is NO.
- Any attempt to thwart the effects on aging of the current (or projected) levels of fertility and mortality, will entertain the current desequilibrium in the age structure and will thus require a constantly growing number of immigants.
- In France, we would need 800 000 immigrants in 2005, 2 millions in 2020, 3 millions in 2050 (near 100 millions in all over the next 50 years)

4/ Effects of aging on family structures

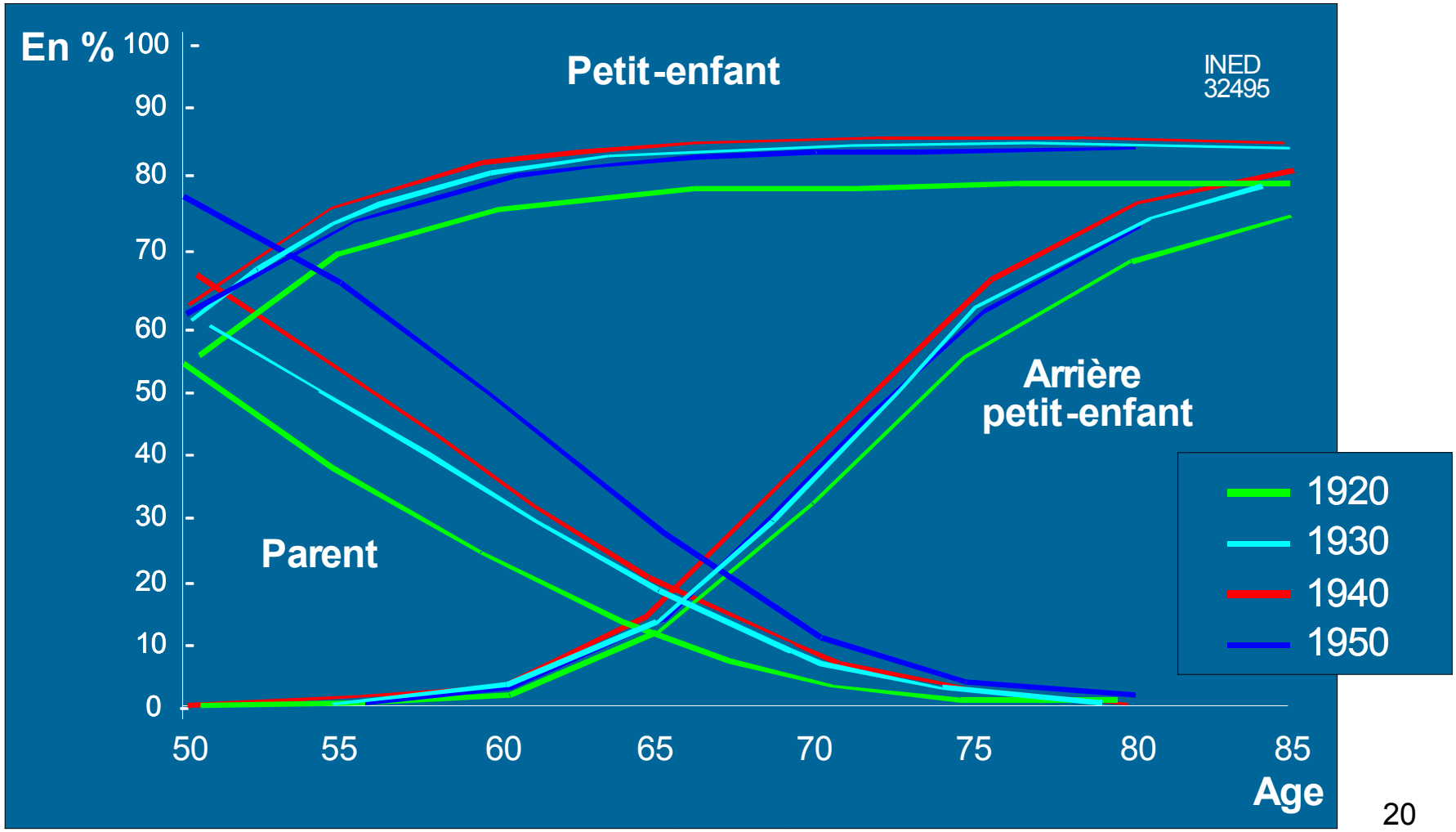
- In Ancient France (E_0=30 years), at birth 84% of children had at least one grandparent alive (and 52 % at least two). About 20 % had at least one great-grandparent.

  At 20 years of age, the proportions were respectively 30%, 6% and 0.

- When E_0=80 years, near 100% of newborn have at least 2 grandparents, and 95 % have at least one great-grandparent.

  At 20 years, 98 % still have at least one grandparent and 45% one great-grandparent.

Pourcentage par âge de femmes ayant au moins un parent vivant, un petit -enfant et un arrière -petit-enfant

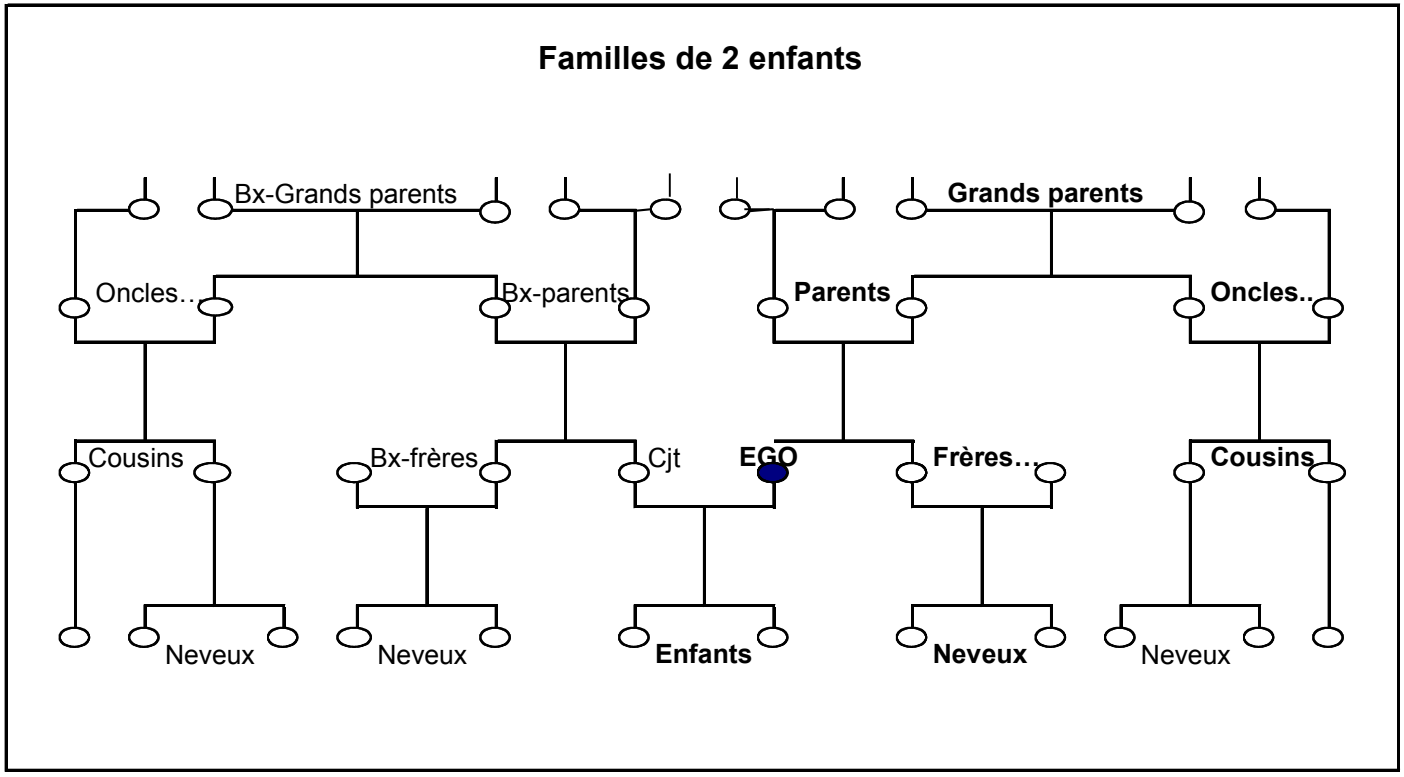


A network changing over the life course

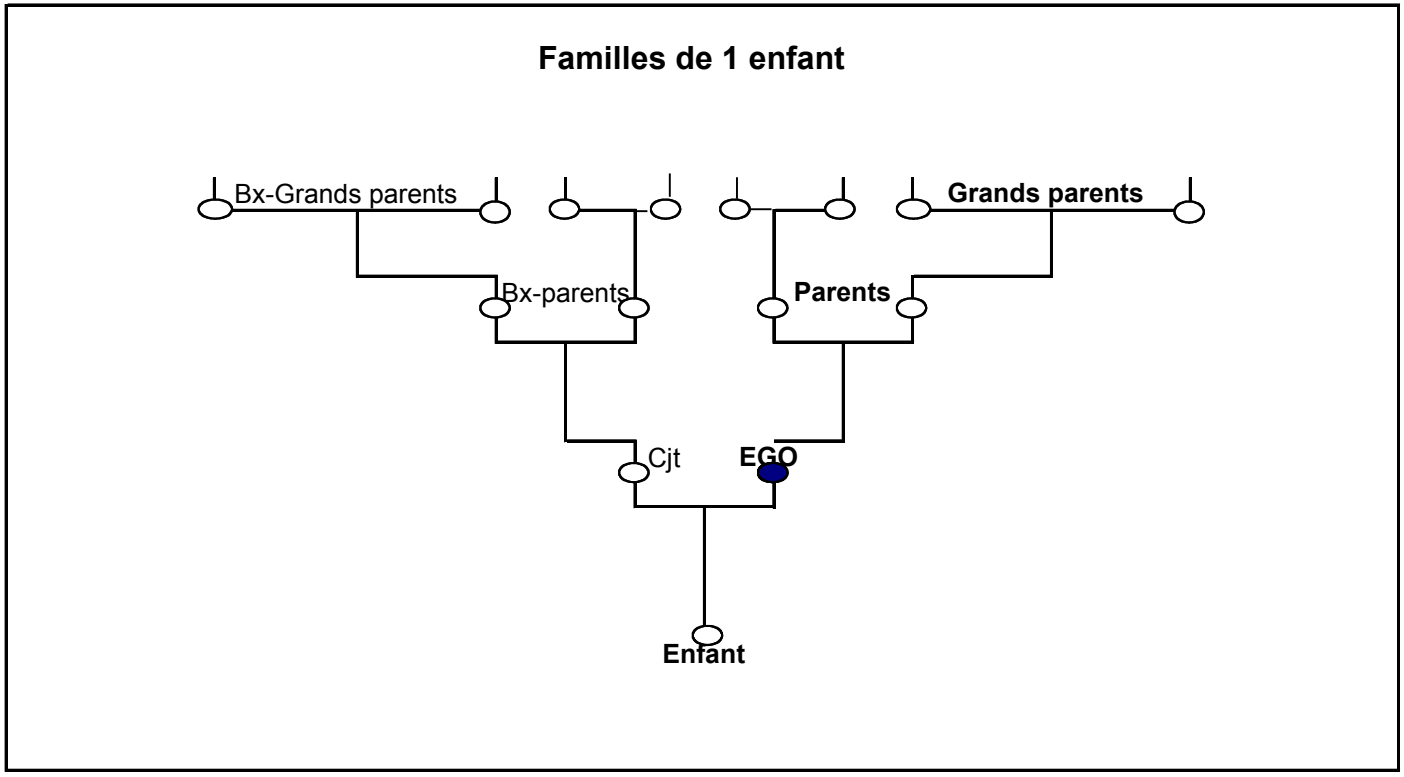
(Hypotheses : E_0=80 yrs, 2 children per woman)

Age d'EGO	Nombre de générations dans la famille d'EGO :				
	< 3	3	4	5	Ensemble
0	0	5	70	25	100
20	3	52	37	8	100
40	5	38	50	7	100
60	14	29	53	4	100
80	15	8	72	5	100
90	15	4	50	31	100

If everybody has 2 children…



… and if the one-child family is the rule



… But the recomposition of families (after divorce) make the network more complex.

TO CONCLUDE:

- Aging is an inescapable process, due to the transition from high mortality and fertility to low mortality and fertility
- This is a totally new situation in the history of mankind, a true Revolution
- We must prepare ourselves to this major change, by rethinking the entire life course and by taking into account the new family structures.