

**“Toward an Ecological–Evolutionary Theory
of the Incidence of Warfare in Preindustrial
Societies” *Sociological Theory* 21 (1):18–30,
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**or, why Keeley is wrong on pages
117-121 of *War Before Civilization***

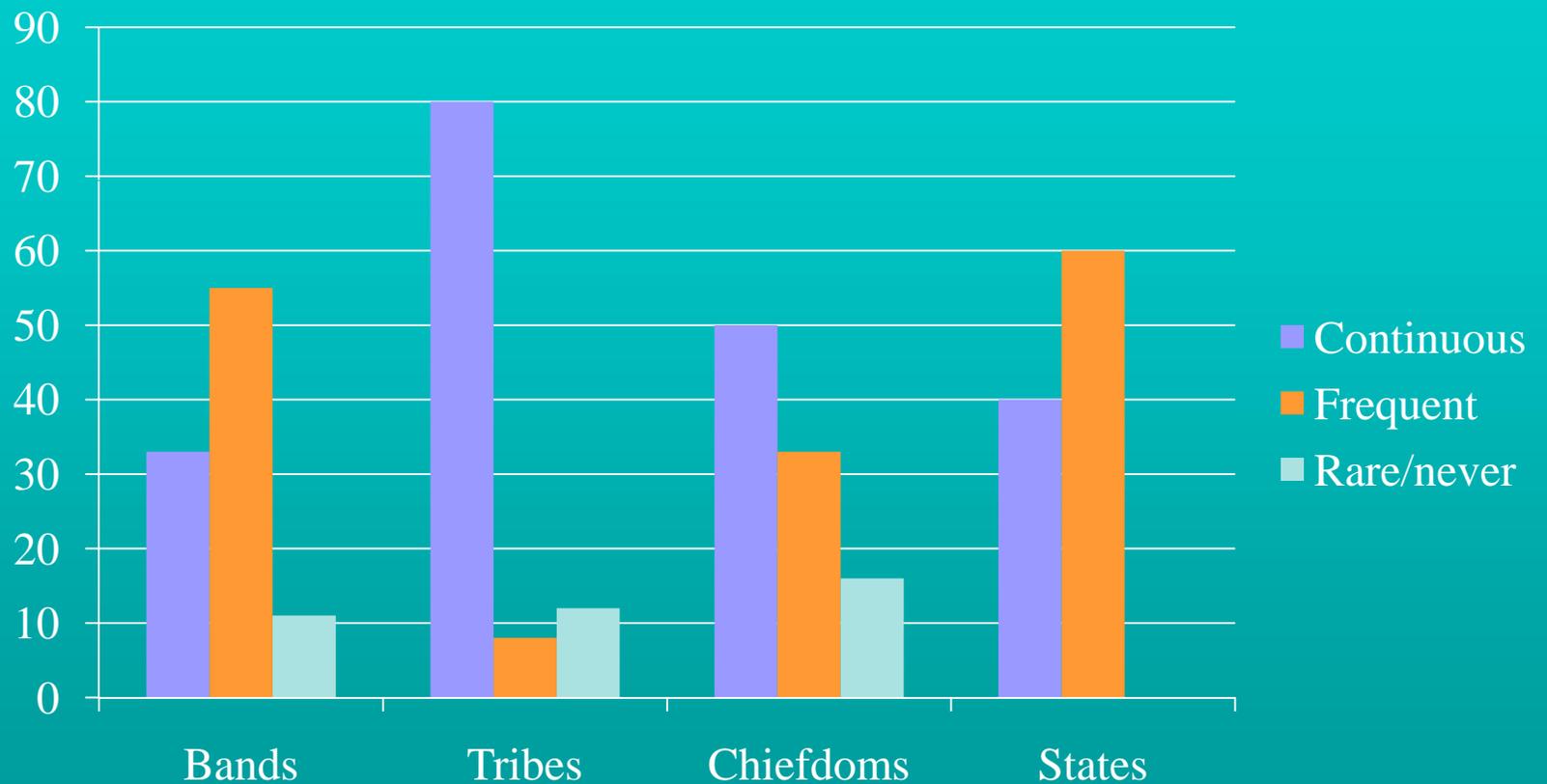
Experts on War

- Otterbein: “As the analysis of the data proceeded it became clear that ecological and economic factors had little influence in comparison to type of sociopolitical system, upon the warfare variables.”
- Keeley: “Indeed, two cross-cultural samples of societies indicates that absolutely no correlation exists between frequency of warfare and the density of human population.” (p. 118)
 - Keeley suggests that living in bad neighborhoods and “hard times” lead to war. Interestingly, hard time is essentially an economic rationale for war which somehow escapes Keeley
- Kelly provides limited proof that war and population density are correlated among foragers in chapter 4
- Ember and Ember’s cross-cultural analysis shows that war is associated with resource problems
- Mel Ember shows that warfare is associated with population density in New Guinea (*Ethnology* (1977) “Land shortage and war in New Guinea”) in a 26 society sample.

Cultural complexity and warfare

- A number of researchers (e.g., Ember) have noted a slight tendency for warfare to increase with sociopolitical and subsistence complexity and then decrease
- In addition, they demonstrated that warfare frequency is associated with resource problems

Cultural Complexity and War



Source: Otterbein 1989

Lenski's Findings: war and economic formation: increases in subsistence intensity associated with warfare frequency (note agricultural societies are omitted in original).

Table 1. Warfare by Type of Society

Warfare	Subsistence Technology			<i>n</i>
	Hunting and Gathering	Simple Horticultural	Advanced Horticultural	
Rare or absent	73%	41%	17%	30
Perpetual or common	27%	59%	83%	43
<i>n</i>	22	22	29	73

Note: Adapted from Lenski and Lenski (1978:164).

Lenski's Model Broadened and Simplified

Table 2A. Warfare by Type of Society

Warfare	Subsistence Technology				<i>n</i>
	Hunting and Gathering	Simple Horticulture	Advanced Horticulture	Agrarian	
Rare or absent	39%	30%	14%	17%	27
Present	61%	70%	86%	83%	88
<i>n</i>	23	27	35	30	115

Note: Warfare is from Ember and Ember (1995); see appendix for the source and coding of it and Subsistence Technology. Gamma 0.351, Asymptotic Standard Error (ASE) 0.153; Pearson product moment correlation, 0.208, ASE 0.094; Likelihood chi-square ratio (L^2)=6.002, $p=0.106$.

Table 2B. Warfare by Type of Society^a

Warfare	Subsistence Technology		<i>N</i>
	Hunting and Gathering and Simple Horticulture	Advanced Horticulture and Agrarian	
Rare or absent	34%	15%	27
Present	66%	85%	88
<i>n</i>	50	65	115

Note: Warfare is from Ember and Ember (1995); see appendix for the source and coding of it, and Subsistence Technology. Gamma 0.478, Asymptotic Standard Error (ASE) 0.176; Pearson product moment correlation, 0.218, Asymptotic Standard Error (ASE) 0.092; Likelihood chi-square ratio (L^2)=5.432, $p=0.02$.

^aIn this table, hunting and gathering societies have been combined with simple horticultural societies in order to contrast them with the combination of advanced horticultural and agrarian societies.

When horticulture is divided into 2 types the correlation disappears and when hunting and gathering is compared to all others the pattern reasserts itself

Approach

- Use of HRAF SCCS of 186 well described societies
- Followed Ember and Embers' definition of war and warfare intensity measures
- Uses Murdock and Provost's measures of population density and cultural evolutionary stage

Nolan's theory (an implicit cost-benefit analysis)

- Argues that warfare is likely to be uncommon among foragers because
 - Have no stored resources
 - Have the option to move away when trouble comes
 - Note that the above option assumes that the environment is not filled with other foragers and/or suitable alternative land exists
- Warfare among horticulturalists more likely because they have
 - Stored resources
 - Difficulty of movement because
 - houses and other costly productive investments (processing structures)
 - productive land occupied by other people who are highly motivated to defend their territory
 - Improved land
 - Clearance
 - Irrigation
 - Water control
 - Soil improvement

Population density & warfare

- A number of theorists have argued that if warfare is over economic resources there should be a correlation between population density & warfare
- Because high density means greater scarcity and therefore more motivation for war
- However, there are no consistent correlations (see next slide)
- Why?

From below Keeley argues an absence of consistent relationship between population density and warfare

Table 3. Percentage of Societies with Warfare Every Year by Population Density

	People per Square Mile					
Warfare	Less than 0.2	0.2 to 1.0	1.1 to 5.0	5.1 to 25	26 to 100	More than 100
Every year	44	72	50	55	69	72
<i>n</i>	16	14	12	11	16	18

Warfare increases, decrease, and increases with population density. Keeley's model assumes that simple population density is a reasonable index of resource scarcity.

The problem with simple population density

- Whether or not population density is significant depends on two factors:
 - The quality of the environment (e.g., soil richness or rainfall quantity and reliability)
 - The efficiency of subsistence (e.g., fertilization, irrigation, crop type).
- If environmental quality and subsistence efficiency were held constant then population density would be better tested.

Noland's reanalysis of Keeley: an attempt to control for environmental differences

- Noland compared within economic formations dividing groups that were above and below the median population density (e.g., low density foragers versus high density foragers).
- When population density was above the median for hunter-gatherers and agrarian societies then warfare increased significantly.
- However, this was not true for simple or complex (in terms of social organization) horticultural groups.

Warfare and density with economic formations: significant for foragers but not for simple or advanced horticultural groups

Table 6A. Warfare by Density, Hunting-and-Gathering Societies

Warfare	Population per Square Mile		<i>n</i>
	1 or less	More than 1	
Rare or absent	47%	0%	9
Present	53%	100%	14
<i>n</i>	19	4	23

Table 6B. Warfare by Density, Simple Horticultural Societies

Warfare	Population per Square Mile		<i>n</i>
	25 or less	More than 25	
Rare or absent	29%	30%	8
Present	71%	70%	19
<i>n</i>	17	10	27

Warfare & population density, NS for advanced horticultural but nearly so for agrarian (p=0.06)

Table 6C. Warfare by Density, Advanced Horticultural Societies

Warfare	Population per Square Mile		<i>n</i>
	100 or less	More than 100	
Rare or absent	8%	27%	5
Present	92%	73%	30
<i>n</i>	24	11	35

Table 6D. Warfare by Density, Agrarian Societies

Warfare	Population per Square Mile		<i>n</i>
	100 or less	More than 100	
Rare or absent	31%	6%	5
Present	69%	94%	25
<i>n</i>	13	17	30

Conclusions

- Among foragers, modified population density (below and above mean contrasts) positively associated with warfare
- Horticulturalists (advanced or simple): modified population density not associated with warfare
- Agriculturalists: marginal correlation between modified population density and warfare